BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

FIRST SEMESTER 2022-2023

(Course Handout Part II)

29-08-2022

In addition to part I (general handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. **: BIOT F347**
Course Title **: Immunotechnology**

Instructor in Charge **: Dr. Trinath Jamma**

1. Course Description: Introduction to immune system, cell mediated and humoral immunity, immunity to infectious diseases, immune mechanisms involved in health and disease**.** Advances in Immunotechnology have made it possible to diagnose several diseases and also to produce immunological agents that protect people and animals against many types of diseases.

2. Scope and objective of the course: This course has been designed to provide an insight in the concept and latest developments in applications of immunology-based approaches and advances within this field include the application of genetic engineering to produce edible vaccines, nanobodies, etc. Biotechnology based therapeutic substances called 'biologics' provide new effective treatments for auto-immune diseases such as rheumatoid arthritis. Frequently biotechnological approaches in immunology are described as immunotechnology.

3. Text Book (TB): Immunology and Immunotechnology (Ashim K. Chakravarty)

4. Reference Book (RB)
RB1 - Kuby Immunology by Kindt et al., 6th Ed. Freeman press. 2013.
RB2 - Immunology: An Introduction, Tizard, Cengage publication, 4th Ed. 2010
RB3 - Theory and problem of immunology (Schaum's outlines) www.worldcat.org/.../schaums-outline...theory-and-problems-of-immun..

5. Course Plan:

Lect. #	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-3	Introduction and overview	Introduction to immunology, concept of innate and adaptive immunity	TB Ch 1, RB1 Ch 1
4-5	Assay for antibody secreting cells	Preparation of antigen, Immunization, collection of antiserum, collection of antiserum	TB Ch 18 RB 2 Ch 6

6-7	Separation and identification of protein or Antigen	Immunoprecipitation and affinity chromatography, SDS-PAGE, preparation of 8% Non-denaturing polyacrylamide gel for separation of DNA, Isoelectric focusing, 2-D gel electrophoresis, western blotting	TB Ch 18 RB2 Ch 6
8-10	Hybridoma Technology: Monoclonal Antibodies	Myleoma tumours, procedure for generation of hybridomas, instability of hybridomas, Human monoclonal antibodies, Monoclonal antibodies acting as enzymes, coating antibodies	TB1 Ch 18 RB2 Ch 6
11-13	Antibody engineering	Chimeric and hybrid monoclonal antibodies, monoclonal antibodies constructed from Ig-gene	TB Ch18 RB2 Ch 6
14-18	Phage Display	Phage display libraries, abzymes, antibody engineering, therapeutic uses of antibodies and cytokines	RB 1 Ch 5
19-24	Infectious diseases and vaccines	Types of infectious diseases, immune invasion by microbes, Active and passive immunization, designing for active immunization, recombinant-vector and DNA vaccines, multivalent subunit vaccines	TB Ch 17 RB1 Ch 19
25-28	Gene transfer technology & SCID mice	Transgenic cell lines, transgenic mice Gene-targeted knockout mice, specific deletion of a gene in a tissue by inducing the cre/loxp system	TB Ch 18 RB2 Ch 6
29-32	Bone marrow transplantation	Transplantation of haematopoitic stem cells, Tissue culture, cell culture cell culture and cell lines	TB Ch 18 RB2 Ch 6
33-34	Tissue culture	Cell culture, cell lines, cell culture techniques, culture media, sterilization, atmosphere and gas phase	TB Ch 18 RB2 Ch 6
35-37	Other techniques	Micro array technology, DNA foot printing, and cancer Immunotherapy	TB Ch 18
38-40	Advancements in Immunotechnology	Recent research articles and case studies	-

6. Evaluation scheme:

Component	Duration	Weightage (%)	Date & Time	Venue	Nature of Component
Mid Sem	90 min	30%	02/11 9.00 - 10.30AM	To be announced	CB
Surprise Quizzes	10 min	15%	During Class hours		OB
Announced Assignments	10 min	15%	During Class hours		OB
End Sem	180 min	40%	22/12 FN	To be announced	CB

7. **Chamber consultancy hour**: To be announced in class room.
8. **Notices**: Notices will be displayed on Bio Notice Board/CMS Tools.
9. **Make up Policy**: Make up may be granted only for genuine cases such as hospitalization.
10. **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.

Instructor in Charge BIO F342