**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 humoralimmunity, 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 aninsight 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..

1. **Course Plan:**

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| --- | --- | --- | --- |
| 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 | - |

1. **Evaluation scheme:**

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| --- | --- | --- | --- | --- | --- |
| **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 |

1. **Chamber consultancy hour**: To be announced in class room.
2. **Notices**: Notices will be displayed on Bio Notice Board/CMS Tools.
3. **Make up Policy**: Make up may be granted only for genuine cases such as hospitalization.
4. **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**