**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

**SECOND SEMESTER 2023-2024**

**(Course Handout Part II)**

09.01.2024

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.** **: BIO F342**

**Course Title** **: Immunology**

**Instructor in Charge** **: Prof. TRINATH JAMMA**

**Lecture Instructors : Prof. Trinath Jamma (1-20 lectures) and Prof. Vidya Rajesh (21-40)**

**Tutorial Instructor : Trinath Jamma and Vidya Rajesh (respective portions).**

**Course Description**: Introduction to immune system, cell mediated and humoral **i**mmunity, immunity to infectious diseases, immune mechanisms involved in cancer, immunodeficiency, autoimmunity, vaccination and organ transplantation.

**Scope and objective of the course:** This course has been designed to provide aninsight in the concept and latest developments in immunology. Emphasis will be given on developing a molecular, cellular and clinical perspective of the area.

1. **Text Book (TB):** Kuby Immunology by Kindt et al., 6th Ed. Freeman press. 2007.
2. **Reference Book (RB)**

RB1 - Kuby Immunology by Owen et al., 7thEd. Freeman press. 2013

RB2 - Immunology: An Introduction, Tizard, Cengage publication, 4th Ed. 2010

RB3- Cellular and Molecular Immunology by Abul K. Abbas *et al*; 7th Ed., Elsevier press. 2012

1. **Course Plan:**

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| Lect. # | Learning Objectives | Topics to be covered | Reference |
| 1-2 | Introduction and overview of the Immune system | Introduction to immunology, concept of innate and adaptive immunity | TB Chapter 1 |
| 3-4 | Cells and organs of the immune system | Hematopoiesis, cells and organs of the immune system (only functional aspects) | TB Chapter 2 |
| 5-6 | Innate immunity | Natural barriers, effector cells and molecules, receptors and signaling | TB Chapter 3 |
| 7-8 | Antigens and Antibodies | Hapten and antigens, Immunogenicity and antigenicity, epitopes, antibody classes and biological activities | TB Chapter 4 |
| 9-11 | Organization and expression of immunoglobulin genes | Multigene organization of Ig genes and gene rearrangement (B cell receptors) | TB Chapter 5 |
| 12-15 | B cell generation, activation and differentiation | B cell maturation, activation, proliferation, humoral response, regulation of immune effector response | TB Chapter 11 |
| 16-17 | The Complement system | Complement activation, function, components and regulation | TB Chapter 7 |
| 18-20 | Major Histo-compatibility Complex and antigen presentation | Types, structures, cellular distribution, antigen processing and presentation | TB Chapter 8 |
| 21-22 | T cell receptor | αβ and γδ TCR’s structures and roles, Organization and rearrangement of TCR genes, 3D structures of TCR-peptide – MHC complexes. | TB Chapter 9 |
| 22-24 | T cell maturation, activation and differentiation and effector function | Thymic selection, T cell activation, T-cell differentiation, Cell mediated cytotoxic response | TB Chapter 10, 14 |
| 25-26 | Cytokines | Properties, receptors, functions and methods of analysis | TB Chapter 12 |
| 27-28 | Hypersensitivity | Types of hypersensitivity & related problems | TB Chapter 15 |
| 29-30 | Tolerance and Autoimmunity | Tolerance, organ specific and systemic autoimmune diseases | TB Chapter 16 |
| 31-32 | AIDS, immuno-deficiencies and related diseases | Primary and secondary immunodeficiency’s (concept only), AIDS, immuno-genetic disorder. | TB Chapter 20 |
| 33-34 | Cancer and Immune System | Oncogenes and cancer induction, categories of cancer, immune evasion mechanisms during cancer and cancer immunotherapy | TB Chapter 21 |
| 35-36 | Immune response to infectious diseases | Invasion by microbes, Immuno-evasion mechanisms, Covers immune reaction against viral, bacterial, fungal, parasitic and emerging diseases | TB Chapter 18 |
| 37 - 38 | Vaccines and immune protection | Active and passive immunization, recombinant bacterial and viral vaccines, subunit vaccines,conjugate vaccines, | TB Chapter 19 |
| 39 -40 | New developments in Immunology – recent trends and approaches | Holistic application and understanding of new clinical developments in Immunology with recent examples | Discussion based approach and class notes and references will be provided |

1. **Evaluation scheme: Course total – 200.**

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| **EC No.** | **Evaluation Component** | **Duration** | **Weightage (%) and Marks** | **Date, Time & Venue** | **Remarks** |
| 1. | Mid-semester | 90 min | 25 (50 marks) | 14/03 - 9.30 - 11.00AM | CB |
| 2. | Classroom participation  (This course needs students to focus in classroom to understand concepts) | Presence, attentiveness and interaction during lectures and tutorials | 5 (10 Marks)  (Can start with 0 too) | Every class | Final marks based on observation of team – No appeal on marks |
| 3. | Announced Quizzes - 02 | One before mid-semester and one after mid semester | 20 (40 marks) | Tutorial hours | CB |
| 4. | Group Assignment -1 | Team of max. 3 students | 10 (20 marks) | Summarizing any one assigned chapter in the form of a A3 poster | OB |
| 5. | Compre exam | 3 hours | 40 (80 marks) | 13/05 FN | CB + OB (20% CB + 20% OB) |

1. **Chamber consultancy hour**: To be announced in classroom or tutorial.
2. **Notices**: Notices will be displayed on Bio Notice Board and CMS.
3. **Make up Policy**: Make-up decisions will be made on a case-by-case basis and only genuine cases as determined by the team and validated by Wardens and/or Medical Officer will be considered. However, there will be no make-up for assignments and surprise quizzes.
4. **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.

**Instructor In Charge,**

**BIO F342 Immunology.**