

# 20BT007 IMMUNOTECHNOLOGY AND INFORMATICS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	-	-	-	-	-	-

## Course Description and Objectives:

The objectives of this laboratory course are to develop an understanding about practical aspects of components of immune system as well as their function. Basic as well as advanced methods will be taught to detect different antigen and antibody interactions, isolation of different lymphocyte cells etc. and how they can be used in respective research work.

## Course Outcomes:

Upon successful completion of this course, the student will be able to

- Evaluate the usefulness of immunology in different pharmaceutical companies
- Identify proper research lab working in the area of their own interests
- Apply their knowledge and design immunological experiments to demonstrate innate, humoral or cytotoxic T lymphocyte responses and figure out the kind of immune responses in the setting of infection (viral or bacterial) by looking at cytokine profile.

## SKILLS:

- ✓ Antigen Antibody significance in diagnosis
- ✓ Immuno diagnostics by different methods
- ✓ Construction of cDNA phage display libraries

**ACTIVITIES:**

- o Blood collection from laboratory animals eg. Mice, Rabbit
- o Handling laboratory animals eg. Mice, Rabbit
- o Antigen administration to laboratory animals eg. Mice, Rabbit, chicken

**UNIT - I**

**Immune system Over View:** Cells and organs of immune system; innate and acquired immunity, Complement system, theory of clonal selection. Development, maturation, activation and differentiation of T-cells and B-cells; antigen presenting cells, major histocompatibility complex, antigen processing and presentation; TCR and its diversity, Autoimmunity, Hypersensitivity, Tolerance, Cytokines

**UNIT - II**

**Antigen and antibodies:** Antigens: chemical and molecular nature; haptens; adjuvants; Antibodies: structure and functions of antibodies; genetic control of Ab production. Isotype, allotypes, Idiotypes; antigen-antibody reactions and their significance in diagnosis; monoclonal and polyclonal antibody production: principles and applications, Immunotoxichimeric antibodies and abzymes, Monoclonal antibodies.

**UNIT - III**

**Immuno diagnostics:** Injury and inflammation; immune responses to infections: immunity to viruses, bacteria, fungi and parasites, Rapid Blood Test, RT PCR, ELISA, immunosuppression, AIDS, vaccines, Immunoelectrophoresis, Immunodiffusion. IgY in immune diagnostics, Blockade of immune check point therapy, Transplantation, MLR, Complement fixation test.

**UNIT - IV**

**Phage display:** Filamentous phage biology: Phage display vectors, Analysis of phage borne peptides. Construction and use of Phage displayed peptide libraries. Construction and selection from cDNA phage display expression libraries. Analysis of selected antibodies, Production and purification of Fab and sCFV, Amplification of antibody genes, Cell surface selection and analysis of monoclonal antibodies from Phage libraries.

**UNIT - V**

**Immunoinformatics:** KIR and HLA database, Prediction of epitopes, vaccine design, Web based tools for vaccine design. IMGT: the international Immunogenetics database, Use of software tools: IEDB, SnapGene, C-ImmSim, VaxiJen, I-TASSER.

**TEXT BOOKS:**

1. Hudson, L., Hay, F. C., & Hudson, L. (1989). *Practical immunology* (Vol. 11). Oxford: Blackwell Scientific.
2. Deetrick, B. (2002). *Manual of clinical laboratory immunology*. American Society Microbiology.

**REFERENCE BOOK:**

1. Kemeny, D. M., & Challacombe, S. J. (Eds.). (1991). *ELISA and other solid phase immunoassays: theoretical and practical aspects*. John Wiley & Sons.