

# 16BT405 IMMUNOLOGY AND IMMUNOINFORMATICS

Hours Per Week :

L	T	P	C
3	-	2	4

Source:

[www.immunology.conferenceseries.com/europe/](http://www.immunology.conferenceseries.com/europe/)

## Course Description and Objectives:

This course offers the knowledge on the architecture of host defence system, types of immune cells, natural and acquired immunity. The objective of this course is to provide students adequate knowledge about inbuilt host defence parameters and apply informatics tools to study immune susceptibility.

## Course Outcomes:

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

- CO1: Understand the degree of variation in immune susceptibility .
- CO2: Categorize the various components of immune system.
- CO3: Apply various immune techniques to evaluate the function of immune system.
- CO4: Evaluate the individual differences in disease susceptibility through immunoinformatics tools.
- CO5: Understand the Inflammation, Hypersensitivity and Knowledge in transplantation.

## SKILLS:

- ✓ *Handle lab animals.*
- ✓ *Immunize lab animals for the production of antibodies.*
- ✓ *Work on immunodiffusion techniques.*
- ✓ *Perform ELISA.*
- ✓ *Purify IgG.*

UNIT - 1 L-9

OVERVIEW OF IMMUNE SYSTEM: Types of immunity - innate and adaptive; Cells and organs of the immune system; Antigens - epitopes, antigenicity, factors influencing antigenicity; Antigen processing and presentation.

UNIT - 2 L-9

IMMUNOGLOBULINS: Structure and types of immunoglobulins and biological activities; Monoclonal antibodies- production and applications; Cytokines - types and immune response; Complement system.

UNIT - 3 L-9

ANTIGEN-ANTIBODY INTERACTIONS: Antibody affinity and activity -precipitation, agglutination; Radio immuno assay (RIA), ELISA, Western blotting, immunoprecipitation, immunofluorescence and flow cytometry for separation of immune cells; Major histocompatibility complex (MHC) and MLR.

UNIT - 4 L-9

T CELL AND B CELL ACTIVATION: T cell and B cell maturation, activation and differentiation; Leukocyte migration and inflammation; Hypersensitive reactions; Transplantation immunology.

UNIT - 5 L-9

IMMUNOINFORMATICS: Introduction, applications - prediction of epitopes, Web based tools for vaccine design; IMGT- the international immunogenetics database.

ACTIVITIES:

- *Isolation of lymphocytes from mouse spleen.*
- *Preparation of cell specific culture media.*
- *Isolation and differentiation of immune cells.*
- *Preparation of antigens.*
- *Production of polyclonal antibodies.*

### LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS : Total hours 30

1. Blood grouping in humans.
2. Staining of blood smears and identification of immune cells- Immune accessory cells and Immune competent cells.
3. Radial immunodiffusion.
4. Staining of radial immunodiffusion gels to prepare a permanent record.
5. Dot ELISA.
6. Isolation of IgY from chicken egg yolk.
7. Separation of IgY using SDS PAGE.
8. Handling laboratory mice.
9. Antigen preparation and Immunization of mice.
10. Simulation of immunization procedure using banana fruit.

Additional Experiments:

TEXT BOOKS:

1. K. Chakravarthy, "Immunology and Immunotechnology", Oxford University Press, 2006.
2. R. L. Myers, "Immunology: A laboratory manual", Publisher Brown (William C), 2007.

REFERENCE BOOKS:

1. R.A. Goldsby, T. J. Kindt and B. A. Osborne, "Kuby immunology", 4<sup>th</sup> edition, New York: WH Freeman, 2000.
2. D. R. Flower, "Immunoinformatics: Predictive Immunogenicity insilico", Humana Press, 2007.

WEBLINK:

<http://imgt.cines.fr:8104>