

SEMESTER-IV

COURSE 3: IMMUNOLOGY

Theory

Credits: 3

3 hrs/week

I. Course Objectives:

1. Cells and organs of immune system, immunity
2. Antibody structure, types, Antigenicity
3. Types of immunity, cytokines, MHC
4. Hypersensitivity and vaccination
5. Various immunological Techniques

II. Course Outcomes:

On successful completion of the course, the students will be able to

1. Learn about types of immunity and cells of immunity
2. Learn about Antigen and Antibody
3. Learn about cell, humoral immunity and MHC molecules
4. Learn about Hypersensitivity and vaccines
5. Learn about immunological techniques

III. Syllabus

UNIT I Immune system:

1. History and scope of immunology, cells of the immune system -T cells, B cells
2. Immunity, innate immune mechanism, acquired immune mechanism
3. Organs of the immune system (Bone marrow, spleen, Lymphnode, thymus, MALT)

UNIT II Antibody and Antigen:

1. Antibody structure and classes (IgG, IgM, IgA, IgE, IgD), Concept of Antibody diversity
2. Antigen -Types of Antigens Antigenicity (factors affecting antigenicity).
3. Antigenic determinants – adjuvants and haptens, epitopes

UNIT III Immunity:

1. Humoral immunity, cell-mediated immunity -TC-mediated immunity, NK cell-mediated immunity, ADCC.
2. brief description of cytokines, Interleukins
3. Major histocompatibility complex (MHC)-Structure and Functions of Class I, II, MHC Molecules

UNIT IV Hypersensitivity and vaccination:

1. General features of hypersensitivity, Classification of hypersensitivity reactions,
2. Vaccination: Discovery, principles, significance,
3. Types of Vaccines -live, attenuated, killed, recombinant, subunit

UNIT V Immunological Techniques

1. Antigen-antibody reactions: Precipitation, agglutination, complement fixation, immunodiffusion, - Radial immune diffusion, single and, double immune diffusion (Ouchterlony)
2. Hybridoma technology: Monoclonal antibodies and their applications in immunodiagnosis.
3. ELISA, RIA,

III Skills Outcome

On Successful Completion of this Course, the Student shall be able to

1. Learn about the determination of blood group
2. Learn about immunodiffusion methods
3. Learn about production of antibodies

SEMESTER-IV

COURSE 4: BIOINFORMATICS AND BIOSTATISTICS

Theory

Credits: 3

3 hrs/week

I. Course Objectives:

1. Basic concept of bioinformatics
2. Databases and BLAST
3. Sequence alignment, PHYLIP and data analysis
4. Measures of central tendency, dispersion and Probability Distribution
5. Basic statistical tests used in biology for data analysis

II. Course Outcomes

On successful completion of the course, the students will be able to

1. Learn about concept and branches of bioinformatics
2. Learn about searching sequences using databases
3. Learn about computer phylogenetics
4. Learn about the measurement of central tendency
5. Learn about test hypothesis

Syllabus

UNIT – I

1. Scope of computers in biological research, Introduction to Bioinformatics: Definition, nature and scope of bioinformatics.
2. Bioinformatics versus computational biology.
3. Branches of bioinformatics. Basic concepts in bioinformatics.

UNIT – II

1. Basic concepts of system biology. Protein Data Bases -visualization of proteins using database
2. Overview of computer-aided drug design.
3. Searching sequence database using BLAST. Concept of genomics and proteomics

UNIT – III

1. Sequence alignment (pairwise, Multiple sequence alignment) Computational phylogenetics – various applications.
2. PHYLIP software. Microarray,
3. Bio informatics – Experimental design & Over view of data analysis.

UNIT – IV

1. Measurement of central tendency (arithmetic mean, mode and median)
2. Dispersion (standard error and range, standard deviation).
3. Probability and distribution. Poisson and binomial distributions. Normal distribution

UNIT – V

1. Population and sampling, test of significance. Test hypothesis.
2. Student t-test for small samples, F-test, Chi² test for analysis,
3. One-way ANOVA, correlation and regression.

III . Skills Outcome

On Successful Completion of this Course, Student shall be able to

1. Learn about problems of mean median mode
2. Learn about test hypothesis
3. Learn about sequence Retrieval from NCBI