

SYLLABUS OF SEMESTER IV

CORE COURSE 7- MICROBIOLOGY AND IMMUNOLOGY

CORE COURSE 8- ANIMAL SYSTEMATICS AND TAXONOMY

CC - 7: MICROBIOLOGY AND IMMUNOLOGY

(Credit: 3L + 1P)

Course Code: TZ 00 2C 003T

Course Objectives: The objectives of this course are to introduce field of microbiology with special emphasis on microbial diversity, morphology and host- microbe interactions.

Learning Outcome: Define the key concepts in immunology, including immunity, antigen, antibody. and immune response.

UNIT- I

Introduction to microbiology and microbes, history & scope of microbiology, morphology, structure. growth and nutrition of bacteria, bacterial growth curve, bacterial culture methods. Virus and bacteriophages, general properties of viruses and viral structure.

UNIT- II

Definitions and fundamentals of microbial control, Sterilization, disinfection and antisepsis, Physical and chemical methods to control microorganisms, Filtration, Radiations, Alcohols, Halogens and Aldehydes etc.

UNIT- III

Host-pathogen interaction, ecological impact of microbes; symbiosis, microbes and nutrient cycles. Probiotics microorganism; Role of probiotics in health and disease, Prebiotics and health benefits.

UNIT- IV

Properties and overview of the immune system. Components of innate and adaptive immunity, Phagocytosis. T and B cell activation and differentiation. Major histocompatibility complex (MHC).

UNIT - V

Properties of antigens and their immunogens, epitopes. Classification, structure and functions of antibodies. Antigen-antibody interaction, Cross reactivity. Principles of vaccination: primary and secondary responses, monoclonal antibodies and hybridoma technology, Agglutination, Immuno-diffusion and immune-electrophoresis, ELISA and RIA.

REFERENCES:

1. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
2. Dubey, R. C., & Maheshwari, D. K. (2008). A textbook of microbiology. S. Chand Publishing.
3. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
4. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
5. Abbas, A., Lichtman, A., & Pillai, S. (2014). Cellular and molecular immunology E-book. Elsevier Health Sciences.

Practical CC-7: MICROBIOLOGY AND IMMUNOLOGY LAB (Credit: 1)

1. Demonstration of lymphoid organs.
 - a. Histological study of spleen, thymus and lymph nodes through slides/photographs.
2. To study antigen-antibody interaction with the help of Ouchterlony method (Immunodiffusion).
 - a. Ouchterlony (double diffusion) assay for Antigen -antibody specificity and titre.
 - b. ELISA
3. Demonstration of Western blotting:
 - a. Protein estimation by Lowry's method /Bradford's method
 - b. SDS-PAGE.
 - c. Immunoblot analysis.
4. Preparation of stained blood film to study various types of blood cells.
5. ABO blood group determination.
6. Study of simple and compound microscopes, their handling including oil immersion objective
7. Preparation of stains, mordant and mounting media – Methylene blue, Crystal violet, Safranin, Nigrosin, Carbol Fuchsin, Malachite green, Gram's iodine, Cotton blue, Glycerine & Lactophenol
8. Preparation of microorganisms for light microscopic observation – simple (direct and indirect) staining, differential staining (Gram-staining), Structural staining – capsule and endospore of bacteria)
9. Demonstration of laboratory equipments – autoclave, pressure cooker, hot air oven, incubator, Inoculation hood/ chamber, Inoculation loop, Inoculation needle, membrane filter and colony counter.