

Name of the Programme: M.Sc. Marine Biotechnology

Course Code: MBT-502

Title of the Course: IMMUNOLOGY AND MARINE PATHOGENESIS

Number of Credits: 3

Effective from AY: 2022 - 23

Pre-requisites for the Course:	No prerequisite is required.
Course Objectives:	<ol style="list-style-type: none"> 1) To provide basic knowledge and appreciate the components of the human immune response that work together to protect the host. 2) To understand the concept of immune-based diseases as either a deficiency of components or excess activity as hypersensitivity 3) To gain an insight into the mechanisms that lead to beneficial immune responses, immune disorders and immune deficiencies. 4) To introduce the common fish/shellfish pathogens, understand their growth characteristics and control and preventive measures.
Content:	<div style="text-align: center;"><u>MODULE I – Concepts and Basics</u></div> <ul style="list-style-type: none"> Introduction – History and scope of immunology Innate immunity: - factors, features and processes. Acquired: - the Specificity, memory, recognition of self from non-self. Cells of the immune system: Hematopoiesis and differentiation, Lymphoid and Myeloid lineage, lymphocyte trafficking, B lymphocytes, T lymphocytes, macrophages, dendritic cells, natural killer and lymphokine-activated killer cells, eosinophils and mast cells, lymphocyte subpopulations and CD markers. Organization of lymphoid organs: - MALT, GALT, SALT Phagocytosis: oxygen-dependent/ independent killing intracellularly. Major histocompatibility complex...Structure of MHC molecules, basic organization of MHC in human, haplotype-restricted killing. Nature and biology of antigens and superantigens: haptens, adjuvants, carriers, epitopes, T-dependant and T-independent antigens.
	No. of hours
	15

	<p><u>MODULE II</u> – Defense Components: Constituents of the immune system and effector mechanisms of immune responses</p> <ul style="list-style-type: none"> • Humoral immunity: cells, antibody formation, primary and secondary response. • Immunoglobulins – structure, distribution and function. • Antigen – Antibody interactions: forces, affinity, avidity, valency and kinetics. • The basics of Immuno-diagnostics. • Complement system: mode of activation, classical, alternate and MBL pathways. Structures of key components. • Cell mediated immune responses: cell activation, cell-cell interaction and cytokines. • Cell-mediated cytotoxicity: Mechanism of T cell and NK cell mediated lysis, antibody-dependant cell-mediated cytotoxicity. • Hybridoma technology and monoclonal antibodies. • Hypersensitivity: An introduction to the different types. • Introduction to autoimmune diseases. 	15
	<p><u>MODULE III</u> – Marine Pathogens and Disease Control</p> <ul style="list-style-type: none"> • Introduction to finfish and shellfish diseases: bacterial, fungal, parasitic, nutritional, environmental and their control. • Prevention of Fish diseases. • Human bacterial Pathogens associated with fishes and their products - <i>Aeromonas</i> spp., <i>Clostridium</i> spp., <i>Listeria</i> spp., <i>Plesiomonas</i>, <i>Salmonella</i> spp., <i>Staphylococcus aureus</i>, <i>Vibrio</i> spp. and common <i>Enterobacteriaceae</i>. • Marine Biotoxins as biological hazards associated with fish and fishery products. 	15
Pedagogy:	Lectures, tutorials, assignments	
	1. D. Male, J. Brostoff, D. Roth, I. Roitt, Immunology. Elsevier Saunders	

References/ Readings:	<p>publication, 2013.</p> <ol style="list-style-type: none"> 2. D.R. Ward and C.A. Hackney. Microbiology of marine food products. Springer Science, 2012. 3. F. Parthiban, S. Felix, Microbiology of Fish and Fishery Products. Daya Publishing House, 2018. 4. I.M. Roitt, P.J. Delves, S. J. Martin, D. R. Burton, I.M. Roitt, Essential Immunology. Wiley-Blackwell, 2017. 5. J. Punt, S. Stranford, P. Jones et al., Kuby Immunology W.H. Freeman, 2018. 6. P. T. K. Woo, D. W. Bruno. Fish diseases and disorders. Volume 3: viral, bacterial and fungal infections. CABI Publishing, 2011. 7. W. Luttman, K. Bratke, M. Kupper, D. Myrtek, Immunology. Academic Press, 2009.
Course Outcomes:	<ol style="list-style-type: none"> 1. The course will enable students to understand the fundamentals of basic immunological processes in the human system. 2. Knowledge of principles of immunodiagnostics would enable them to upskill effectively for research and development, in the field. 3. The basic overview of Immunology strengthens their foundations for a career in Biotechnology. 4. The Marine Biotechnology students will get an overview of the different marine pathogens and disease control.