

**UNIVERSITY OF MADRAS**  
**M.Sc. DEGREE PROGRAMME IN ZOOLOGY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

**531C4A**

**SEMESTER IV**

<b>Course Objectives:</b>		
The main objectives of this course are:		
<b>1.</b>	To impart conceptual understanding of functional organization of immune system and its responsiveness in health and disease.	
<b>2.</b>	To enable a successful performance in Immunology component of CSIR-UGC NET.	
<b>Course</b>	<b>:</b>	<b>Core XI</b>
<b>Course title</b>	<b>:</b>	<b>Immunology</b>
<b>Credits</b>	<b>:</b>	<b>4</b>
<b>Pre-requisite:</b>		
Students would have basic knowledge in animal science, particularly functional anatomy, cell biology and developmental biology.		
<b>Expected Course Outcome:</b>		
Students would have acquired clear knowledge on		
<b>1.</b>	Various basic concepts in immunology and organization of immune systems.	K2
<b>2.</b>	Mechanisms of immune response in health and their defects in various diseases.	K2 & K4
<b>3.</b>	The application of immunological principles in biomedical sciences including blood transfusion, tissue grafting and organ transplantation.	K3 & K5
<b>4.</b>	Vaccinology and its importance in disease management	K3

**K1- Remember; K2- Understand; K3- Apply; K4-Analyze; K5-Evaluate; K6- Create**

<b>Units</b>	
<b>I</b>	Introduction to Immunology: An overview; Scope of immunology, recognition of self and non-self as a basic functional feature of immune system; Concepts of external and internal defense systems; External (first line / innate) defense system: components, distribution, salient functions; Internal (second line / acquired) immune system: cellular and humoral immune components-distribution, salient functions-primary and secondary immune responses; Immune tissues / organs: types, anatomical location, structure and development; lymphocyte traffic during development; Types of immunity: innate and acquired - types, functional features; concept of adaptive immunity
<b>II</b>	Antigens: Definition, characteristic features and classification; Antigenicity versus immunogenicity; Adjuvants: definition, types and applications
<b>III</b>	Major effector components of cellular immune system: Lymphocytes - types,

**UNIVERSITY OF MADRAS**  
**M.Sc. DEGREE PROGRAMME IN ZOOLOGY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

	morphology, clones; sub-populations, distribution, B and T cell receptors, B and T cell epitopes, Toll-like receptors; Antigen presenting cells: antigen processing and presentation, MHC molecules and their immunologic significance
<b>IV</b>	Major effector components of humoral immune system: Antibodies - Primary structure, classification, variants and antigen-antibody interactions; Structural and functional characteristics of various antibody classes; Generation of diversity; Monoclonal antibodies: definition, production and applications; Antibody engineering and its applications. Complement system - Components, three major activation pathways, and immune functions including anaphylaxis and inflammation. Cytokines - Definition and salient functional features; Interleukins: definition, types (lymphokines and monokines), and functions. Interferons - Origin, types and functions
<b>V</b>	Diseases and immune responses: Hypersensitivity: definition, Types I to IV and immune manifestations; Auto-immune diseases: onset, spectrum of diseases, and major immune responses; Immunodeficiency diseases: types including SCID and consequences; Viral (HIV), bacterial (tuberculosis) and parasitic (malaria) diseases: etiology, host immune responses and evasion by pathogens; Vaccines: types, preparations, efficacies and recent developments
<b>Reading list</b>	
<ol style="list-style-type: none"> <li>1. Kuby, J. 1997. Immunology. W. H. Freeman &amp; Co., New York, pp-670.</li> <li>2. Male, D. J. Brostoff, D. B. Roth and I. Roitt. 2006. Immunology (7<sup>th</sup> edition), Mosby / Elsevier, Philadelphia, pp-472</li> <li>3. Abbas, A. K and A. H. Lichtman. 2007. Cellular and Molecular Immunology (6<sup>th</sup> edition), W. B. Saunders, Philadelphia, pp-564</li> <li>4. Coica, R. Sunshine, G. 2015. Immunology (Seventh Edition), Wiley Blackwell, UK, pp-406.</li> </ol>	
<b>Recommended texts</b>	
<ol style="list-style-type: none"> <li>1. Weir, D. M and J. Stewart. 1997. Immunology, Churchill Livingstone, London, pp-362</li> <li>2. Janeway, C. A and P. Travers. 1997. Immunology, Garland Publ. Inc., London, pp-904</li> <li>3. Peakman, M and D. Vergani. 1997. Basic and Clinical Immunology, Churchill Livingstone, London, pp-366</li> <li>4. Parham, P. 2009. The Immune System (Third Edition), Garland Science, USA, pp-506</li> <li>5. Weissman, I. Hood, L. Wood, W. 1978. Essential Concepts in Immunology, the Benjamin/Cummings, California, pp-165.</li> <li>6. Hood, L. Weissman, I. Wood, W. Wilson, J. 1984. Immunology (Second Edition), the Benjamin/Cummings, California, pp-558.</li> <li>7. Coica, R and Sunshine, G. 2009. Immunology A Short Course (Sixth Edition), John Wiley &amp; Sons, USA, pp-391.</li> <li>8. Doan, T. Melvold, R. Viselli, S. <i>et al.</i>, 2013. Immunology (Second Edition), Lippincott Williams &amp; Wilkins, Maryland, pp-376.</li> </ol>	

**UNIVERSITY OF MADRAS**  
**M.Sc. DEGREE PROGRAMME IN ZOOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

9. Owen, J. A. Punt, J. Stanford, S. A. 2013. Kuby Immunology (7<sup>th</sup> Edition), Macmillan, England, pp-692.

<b>Mapping with Programme Outcomes*</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	M	S	S	S	S	M	S	S	S
<b>CO2</b>	S	S	M	S	S	S	M	M	S	S
<b>CO3</b>	S	M	M	S	S	S	S	S	S	M
<b>CO4</b>	M	S	M	M	S	S	S	S	S	M
<b>CO5</b>	M	S	S	S	M	S	M	S	S	M

\*S - Strong; M - Medium; L - Low