UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS WITH EFFECT FROM 2023-2024

SEMESTER - VI

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
321C6B	**MICROBIOLOGY AND IMMUNOLOGY**	Core	Y	-	-	-	5	6	25	75	100

Learning Objectives	
CO1	To become familiar with the foundation concepts of history of Microbiology
CO2	To gain the knowledge of bacterial and viral diseases.
CO3	To gain knowledge of microbes in food and environment.
CO4	To understand about different types of immunity and immune response
CO5	To appreciate about immunoglobulins and immunological techniques

UNIT	Details	No. of Hours	Course Objectives
I	History and Scope of Microbiology – Whittaker's classification of microorganisms – Ultra structure – salient features and classification of microbes (Bacteria, Virus, Actinomycetes and Fungi). Bacterial growth and nutritional requirements – culture techniques and types of culture media – media preparation – sterilization techniques – preservation – staining (Gram's staining).	18	CO1
II	Medical microbiology- study of common bacterial and viral diseases in man: Causative organisms, mode of transmission, pathogenicity, symptoms and preventive measures-Bacterial diseases - Typhoid, Tuberculosis, Leprosy, Syphilis. Viral diseases- Influenza, Poxviruses (Chicken pox) Hepatitis- B, AIDS.	18	CO2
III	Food microbiology - Microbial food spoilage, food poisoning, physico-chemical methods in food preservation. Dairy microbiology- Pasteurization, fermented milk products (Curd and Cheese). Industrial microbiology- Basic design of fermentor, industrial fermentation of ethanol, penicillin and enzymes. Environmental Microbiology - Role of microorganisms in the productivity of ecosystem- Biology of Nitrogen	18	CO3

	fixation and nitrogen fixers.		
IV	Scope of Immunology - Types of Immunity- innate and acquired- Organs involved in immunity – structure and functions- Cells involved in immune response - origin and differentiation- significance- Immune response- Humoral and Cell mediated immune response- Mechanism- Primary and secondary immune response.	18	CO4
V	Immunoglobulins - Structure, types, distribution and biological functions- Complements - Classical and Alternative pathways- Hypersensitivity -Types with examples- Autoimmune Diseases - Concept and types- Organ transplantation- types of graft, mechanism of allograft rejection- MHC- Classes- Vaccines- types, vaccination schedule- Immunological Techniques in Clinical Diagnosis- Antigen - antibody reactions – agglutination- precipitation and immunodiffusion.	18	CO5
	Total	**90**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand history, relevance of microbiology and classification of bacteria	PO1
CO2	Understand the cause of various bacterial and viral disease and prevention	PO1, PO5
CO3	Gain knowledge of various microbes related to food, environment and industries.	PO4, PO6
CO4	Will be able to understand the immune response and immunity	PO4, PO5, PO6
CO5	Learn the immunological techniques in detail	PO3, PO8

Text Books (Latest Editions)	
1.	Aneja K.R., Experiments in Microbiology, plant pathology, Tissue culture and Mushroom Cultivation , New Age International, New Delhi.
2.	Atlas R.M., Microbiology – fundamentals and applications, Macmillan Publishing Company, New York.
3.	Ravindra Nath, Fundamentals of Biology Courses for Biotechnology, - Vol.1, Special Bangalore University edition, Kalayani Publishers.

4.	Greenwood D, Richard CD, John S and Peuther F (1992). Medical Microbiology, 16th edition. ELBS, Churchill living stone.
5	**KUBY, J, PUNT, J, STRANFORD, S, JONES,PAND OWEN, J, 2018. IMMUNOLOGY, 8TH EDITION, W.H.FREEMAN PUBLISHING, NEW YORK, 944 PP.**
6	**ROITT, M, PETER J. DELVES, SEAMUS J. MARTIN AND DENNIS R. BURTON, 2017. ESSENTIAL IMMUNOLOGY, 13TH EDITION, WILEY-BLACKWELL PUBLISHING,USA, 576 PP.**
7	**ROITT, M, PETER J. DELVES, SEAMUS J. MARTIN AND DENNIS R. BURTON, 2017. ESSENTIAL IMMUNOLOGY, 13TH EDITION, WILEY-BLACKWELL PUBLISHING,USA, 576 PP.**
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Alexopoulos C.J. and Mims C.W., Introductory Mycology, New Age International, New Delhi.
2.	Thomas M. Bell, 1965. An Introduction to General Virology, William Heinemann Medical books, London.
3.	Stanier R.Y., Ingraham J.L., General Microbiology, Prentice Hall of India Private Limited, New Delhi.
4.	Salle A.J., Fundamental Principles of Bacteriology, Tata McGraw – Hill Publishing Company Limited, New Delhi.
5.	Pelczar .J. Chan E.C.S. and Krieg N.R., Microbiology, McGraw Hill Book Company, New York.
6.	Benson Harold J, Microbiological Applications, WCB McGraw – Hill, New York.
7.	Brock T.D. and Madigan M.T., Biology of Microorganisms, Prentice Hall of India Private Limited.
8.	Collins CH, Patricia M, and Lyne JM (1995). Collins and Lynes Microbiological Methods 7th edition. Grange, Butter Worth, Oxford.
9.	Cappucino JG and Sherman N (1996). Microbiology, A Laboratory Manual 4th edition. Benjamin Cumings Inc. California.
10.	Pelczar MJ, Chan ECS and Krieg NR (1993). Microbiology 5th edition, Tata McGraw Hill.
11.	Madigan MT, Martinko JM and Parker J (2012). Brock Biology of Microorganism, 11th edition Prentice Hall International Inc. London.
12	**ABUL A. ANDREW, LICHTMAN. H, SHIV. P, 2014. CELLULAR AND MOLECULAR IMMUNOLOGY, 8TH EDITION, PUBLISHED BY W.B. SAUNDERS, 544 PP.**

13	**CHAPEL. H, HAENEY. M, MISBAH. S, AND SNOWDEN. N, 2006. ESSENTIALS OF CLINICAL IMMUNOLOGY, 5TH EDITION. BLACKWELL PUBLISHING, 368 PP.**
Web Resources	
1.	https://vlab.amrita.edu/?sub=3&brch=73
2.	https://learn.chm.msu.edu/vibl/
3.	https://mvi-au.vlabs.ac.in/
4.	https://virtuallab.tlc.ontariotechu.ca/intro.php
5.	https://www.merlot.org/merlot/viewMaterial.htm?id=79694
6	HTTPS://WWW.AAAAI.ORG/ HTTPS://WWW.BSACI.ORG/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M	M						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong(3) M-Medium (2) L-Low (1)