DEPARTMENT OF ZOOLOGY				*CLASS: II B.Sc. Botany*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
IV	Allied	20U4ZAC2	Human Physiology, Microbiology & Immunology	4	4	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	
Skill oriented			Entrepreneurship oriented	

Course Objectives

By the end of the course, students will be able:

1. To understand the structures and basic facts of human physiology.
2. To explain cellular basis of physiological functions in animals.
3. To examine the basic concept of microbiology and various culture techniques and its handling.
4. To compare and create awareness about the various microbial diseases and the causative organisms.
5. To prioritize and inspect the cellular components involved in the immunity and the mechanism, types and concepts regarding immune response.

Unit	Description	Hours	K-level	CLO
I	**Digestion**, **Respiration and Nerves** Digestive system of Man: Structure of alimentary canal, digestive glands (secretion and its functions only). Respiratory system of Man: Structure of lungs, O2 and CO2 transport. Nervous system of Man: Structure of neuron, conduction of nerve impulse through myelinated and non- myelinated nerve.	**12**	Up to K-2	**1**
II	**Excretion and Reproduction** Excretory system of Man: Structure of kidney, nephrons and formation of urine. Reproductive system of man: Structure of male and female reproductive system. Menstrual cycle, Oestrogen, Androgen, Prolactin, Relaxin and Birth control methods.	**12**	Up to K-3	**2**
III	**Microbiology** Five kingdom concept. Sterilization and disinfection, Autoclave, Laminar air flow and Hot air oven. Culture medium (Solid & Liquid) and its composition, types of culture medium. Bacterial growth, growth rate, growth curve. Preservation and pasteurization of milk.	**12**	Up to K-3	**3**

IV	**Microbial Diseases** Cholera, Tuberculosis, Botulism, Rabies and AIDS – causative organism, pathogenecity, mode of transmission, symptoms and their preventive measures.	**12**	Up to K-4	**4**
V	**Immunology** Types of immunity – natural and acquired (active and passive). Lymphoid organs – primary and secondary lymphocytes. Stem, T and B cells, Macrophages. Antigen-antibody reaction (Precipitation and Agglutination). Immunoglobulin – Structure and functions.	**12**	Up to K-4	**5**

Books for Study

1. Arumugam N, Mani A, Narayanan LM, Fatima D, Selvaraj AM, &, 2015. *Immunology and Microbiology*, Saras Publication, Nagercoil.
2. Arumugam N. & Mariakuttikan A, 2014. *Animal Physiology*, Saras Publications, Nagercoil.
3. Verma PS, Tyagi BS, & Agarwal VK. 2010. *Animal Physiology*, S. Chand Publishers, New Delhi.
4. Dubey RC. & Maheswari DK, 2013. *A Textbook of Microbiology*, S. Chand Publishers, New Delhi.
5. Ramesh SR, 2017. *Immunology*, McGraw Hill Education India Private Limited.

Books for References

1. Abul K Abbas, Andrew H. Lichtman, & Shiv Pillai, 2019. *Basic Immunology*, Elsevier.
2. Jain AK, 2017. *Textbook of Physiology*, Avichal Publishing Company.
3. Pelczar MJ, Chan EC, Pelczar MF. 1981. *Elements of Microbiology*. McGraw-Hill International Book Company.
4. Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt, 2017. *Roitt's Essential immunology*, Wiley-Blackwell.
5. Ryan KJ & Ray CG, (Editors), 2004. *Sherris Medical Microbiology.* McGraw-Hill Education.
6. Willey J, Sherwood L. & Christopher J. Woolverton, 2017. *Prescott's Microbiology*, McGraw Hill.

Web resources

https://www.youtube.com/watch?v=S1hdq8ugaQY
https://www.youtube.com/watch?v=PLFq-1h4870
https://www.youtube.com/watch?v=44B0ms3XPKU
https://www.youtube.com/watch?v=W1fw2qQ9Syo
https://www.youtube.com/watch?v=7UU1lhFnDVQ
https://www.youtube.com/watch?v=aPWO71UIvCI

Pedagogy

Chalk and Talk, PPT, group discussion, seminar, interaction, quiz, tutorial and virtual labs.

Rationale for Nature of the course

This course will enable the students to comprehend the basics of human physiology and microbiology. The students can also learn about the various culture techniques and its handling, microbial diseases, the causative organism and cellular components involved in the immunity and the mechanism, types and concepts regarding immune response.

Activities having direct bearing on Skill development/Employability/Entrepreneurship

The acquiring of basic knowledge on human physiology, microbiology and immunology could help the students to understand the structure, functions and mechanism of their own body. The knowledge and skills acquired could be a complement for the students to get through their employability in health and pharma industries.

Course designers:

Dr. L. D. Devasree
Dr. R. Eswaran

LESSON PLAN (Total hours: 60)

Unit	Description	Staff Name	Hrs	Mode
I	Structure of alimentary canal,		1	Lecture, Chalk and Talk, Interaction, PPT & Group Discussion
	Digestive glands (secretion and functions only)		3	
	Structure of lungs		2	
	O_2 and CO_2 transport		2	
	Structure of neuron		2	
	conduction of nerve impulse through myelinated and non- myelinated nerve		2	
			12	
II	Structure of kidney		2	Lecture, Chalk and Talk, Interaction, PPT & Group Discussion
	Nephrons and formation of urine		2	
	Structure of male and female reproductive system		2	
	Menstrual cycle		2	
	Oestrogen, Androgen, Prolactin, Relaxin and		2	
	Birth control methods		2	
			12	
III	Five kingdom concept		1	Lecture, Chalk and Talk, Interaction, PPT & Group Discussion
	Sterilization and disinfection		2	
	Autoclave		1	
	Laminar air flow and Hot air oven		2	
	Culture medium (Solid & Liquid) and its composition, types of culture medium		3	
	Bacterial growth, growth rate, growth curve		2	
	Preservation and pasteurization of milk		1	
			12	
IV	Cholera, Tuberculosis, Botulism – causative organism, pathogenecity, mode of transmission, symptoms and their preventive measures.		6	Lecture, Chalk and Talk, Interaction, PPT & Group Discussion
	Rabies and AIDS – causative organism, pathogenecity, mode of transmission, symptoms and their preventive measures.		6	
			12	
V	Types of immunity – natural and acquired (active and passive)		4	Lecture, Chalk and Talk, Interaction, PPT & Group Discussion
	Lymphoid organs – primary and secondary lymphocytes		2	
	Stem, T and B cells, Macrophages		3	
	Antigen-antibody reaction (Precipitation and Agglutination)		1	
	Immunoglobulin – Structure and functions.		2	
			12	

Course Learning Outcomes:

On successful completion of the course, the student will able to:

CLOs	CLO Statement	Knowledge level
CLO-1	Describe the structure and functions of specific organs in human.	K2
CLO-2	Explain the structure and functions of human physiological systems.	K3
CLO-3	Classify the types of culture medium, sterilization, handling, identification and assessing growth characters of microorganisms.	K3
CLO-4	Compare and contrast various microbial diseases, the causative organisms, symptoms and their preventive measures.	K4
CLO-5	Inspect the types of immunity and cellular components involved in immune response.	K4

Mapping with Programme Specific Outcomes of Botany

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CLO-1				3			3	2
CLO-2				3			3	2
CLO-3				3	2	2	3	3
CLO-4				3			3	3
CLO-5				3			3	2

3- Advance application; 2- Intermediate level; 1- Basic level

Mapping with Programme Outcomes

	PO-1	PO-2	PO-3	PO-4	PO-5
CLO-1	2	3	2	3	2
CLO-2	2	2	2	2	3
CLO-3	2	3	1	3	3
CLO-4	2	3	2	3	2
CLO-5	2	3	2	3	3

3- Advance application; 2- Intermediate level; 1- Basic level

BLUE PRINT FOR INTERNAL ASSESSMENT - I
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K 2	2	K1& K2	1	K1	2 (K2&K2)	1(K2)	
2	CLO 2	Up to K 3	2	K1& K2	2	K2	2 (K3&K3)	2(K2/K3)	
No. of Questions to be asked			4		3		4	3	14
No. of Questions to be answered			4		3		2	2	10
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		10	20	40

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

BLUE PRINT FOR INTERNAL ASSESSMENT - II
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 3	Up to K3	2	K1& K2	1	K1	2 (K2&K2)	2(K2/K3)	
2	CLO 4	Up to K4	2	K1& K2	2	K2	2 (K3&K3)	1(K4)	
No. of Questions to be asked			4		3		4	3	14
No. of Questions to be answered			4		3		2	2	10
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		10	20	40

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

BLUE PRINT FOR EXTERNAL

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1	CLO 1	Up to K2	2	K1& K2	1	K1	2 (K1&K1)	1(K2)
2	CLO 2	Up to K3	2	K1& K2	1	K1	2 (K2&K2)	1(K3)
3	CLO 3	Up to K3	2	K1& K2	1	K2	2 (K3&K3)	1(K3)
4	CLO 4	Up to K4	2	K1& K2	1	K2	2 (K4&K4)	1(K4)
5	CLO 5	Up to K4	2	K1& K2	1	K2	2 (K3&K3)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	**Total Marks**	% of Marks without choice	Consolidated
K1	5	2	10	--	**17**	14.16	**42%**
K2	5	8	10	10	**33**	27.5	
K3	-	-	20	30	**50**	41.67	**42%**
K4	-	-	10	10	**20**	16.67	**16%**
Total Marks	10	10	50	50	**120**	100.00	**100%**