DEPARTMENT OF ZOOLOGY				*CLASS: II B.Sc. Zoology*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
IV	Allied	20U4ZAP2	Zoology Ancillary Practical – II	1	2	40	60	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 learn the techniques of physiology, immunology and microbiology.
2. To understand the physiological instruments, microbiological techniques and immunological molecules.

S.No.	Experiments
1.	Estimation of oxygen consumption of fish with reference to body weight
2.	Estimation of oxygen consumption of fish with reference to temperature
3.	Estimation of O2 in water sample
4.	Estimation of CO2 in water sample
5.	Lymphoid organs in Chick (Demo)
6.	Blood grouping - Man.
7.	Simple staining
8.	Gram's staining
9.	Hanging drop method.
	Spotters
	Sphygmomanometer, Kymograph, Autoclav, Bacterial growth curve, Double immunodiffusion, Antibody structure, Gene cloning, DPT vaccines.

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

http://www.iworx.com/documents/LabExercises/O2Consumption-AerobicResp.pdf
https://www.youtube.com/watch?v=frtln5ZoeNQ
https://www.msdmanuals.com/professional/multimedia/lab-tests/v44088168
https://www.youtube.com/watch?v=FKdzbgHaQQM
https://www.youtube.com/watch?v=PLhbRulwNVo
http://nbtc.naco.gov.in/assets/resources/training/5.pdf

Pedagogy

PPT, group discussion, interaction, tutorial and virtual labs.

Rationale for Nature of the course

The course will supplement the laboratory skills of students on animal physiology, immunology, microbiology and human blood grouping.

Activities having direct bearing on Skill development/Employability/Entrepreneurship

The acquiring of practical hands on training skills on the experiments in the field of animal physiology, microbiology, and immunology could help the students to improve their career in higher studies and research.

Course designers:

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

LESSON PLAN (Total hours: 30)

Cycle	Description	Staff Name	Hrs	Mode
Experiments				
1	Estimation of oxygen consumption of fish with reference to body weight.		2	Procedure with Experiment
2	Estimation of oxygen consumption of fish with reference to temperature		2	Procedure with Experiment
3	Estimation of O2 in water sample		2	Procedure with Experiment
4	Estimation of CO2 in water sample		2	Procedure with Experiment
5	Lymphoid organs in Chick (Demo)		2	Procedure with illustration
6	Blood grouping – Man		2	Procedure with Experiment
7	Simple staining		2	Procedure with Experiment
8	Gram staining		2	Procedure with Experiment
9	Hanging drop method		2	Procedure with Experiment
Spotters				
10	Sphygmomanometer, Kymograph		2	Instrument with comments
11	Autoclave, Bacterial growth curve		2	Instrument with comments
12	Double immunodiffusion, Antibody structure		2	Illustration with comments
13	Gene cloning, DPT vaccines		2	Illustration with comments
14	Internal Practical Test			
15	Summative Practical Examination			

Course Learning Outcomes:

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

CLOs	CLO Statements	Knowledge level
CLO-1	Understand the basic facts of animal physiology.	K2
CLO-2	Describe the structure and functions of the immune system.	K3
CLO-3	Apply the knowledge to identify and assess the microorganisms.	K3
CLO-4	Analyse the human blood groups and their functions and significance.	K4
CLO-5	Examine the role of immune system and cellular and molecular basis of immune response.	K4

Mapping with Programme Specific Outcomes

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	PSO-9
CLO-1		1	1	1	1		1	1	1
CLO-2		1	3	3			2	1	2
CLO-3		2	3	2			3	2	2
CLO-4		1	3	3			3	3	2
CLO-5		2	2	2	2		2	2	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	2	1	2	1
CLO-2	2	2	2	1	2
CLO-3	2	2	1	3	2
CLO-4	3	2	2	2	1
CLO-5	3	2	3	3	3

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