DEPARTMENT OF ZOOLOGY				*CLASS: II B.Sc. Zoology*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
III	Core	20U3ZMP3	Major Practical – III	2	3	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 understand the techniques of cell biology and biochemistry.
2. To operate the instruments using in cell biology and biochemistry experiments.
3. To estimate and qualitative analysis of the macromolecules.

	Experiments
1.	Operational methods and uses of microscope, camera lucida, stage and ocular micrometers.
2.	Observation and measurement of cell.
3.	Preparation of cells and tissues: Squamous epithelium, Striated, Smooth and Cardiac Muscle.
4.	Cell division - Mitosis - Root tips, Meiosis - Grass hopper testis.
5.	Cell Counts - Total count RBC & WBC of Human, Differential Count.
6.	Estimation of carbohydrate, proteins and lipids.
7.	Qualitative analysis of carbohydrates, protein and lipids.
	Spotters
	pH meter, Centrifuge, Spectrophotometer, Paper Chromatography, Agarose Gel Electrophoresis, Polyacrylamide Gel Electrophoresis, DNA & RNA.

Books for References

1. David L. Nelson & Michael M. Cox, 2017. *Lehninger Principles of Biochemistry*, Macmillan.
2. De Robertis, EDP. & De Robertis, EMF. 2010. *Cell and Molecular Biology*, Lippincott Williams & Wilkins.
3. Gupta, PK. 2018. *Cell Biology*, Rastogi Publications, Meerut.
4. Jain, JL., Jain, N. & Jain, S. 2016. *Fundamentals of Biochemistry*, S. Chand Publications, New Delhi.
5. Pawar, CB. 2019. *Cell Biology*, Himalaya Publications.
6. Ramadevi, K. 2016. *Ambika Shanmugam's Fundamentals of Biochemistry for Medical Students*, Wolters Kluwer India Pvt Ltd.

Web Resources

https://www.youtube.com/watch?v=5-ur7bWqlDQ
https://www.youtube.com/watch?v=7AWu4Qb_Emk
https://www.youtube.com/watch?v=tsG2e9gPOqw
https://www.youtube.com/watch?v=QacQmS3aaTI

Rationale for Nature of the course

The students can develop their skills in operating microscopes, camera lucid and micrometers. They could develop their skills to study cell division, cell counts, preparation of cells and tissues, estimation and qualitative analysis of macromolecules and techniques used in biochemistry can be learned.

Activities having direct bearing on Skill development/Employability/Entrepreneurship

Acquiring of skills on operating advanced instruments in the field of cytology and biochemistry, and knowledge on qualitative and quantitative estimation of macromolecules will ensure their career in higher studies, research institutes and industries.

Pedagogy

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

Course designers

Dr. B. Latha
Dr. P. Sivakumar

LESSON PLAN (Total hours: 45)

Cycle	Description	Staff Name	Hrs	Mode
Experiments				
1	Operational methods and uses of microscopes		3	Live demo with instruments
2	Operational methods and uses of camera lucida, stage and ocular micrometers		3	Live demo with instruments
3	Observation and measurement of cell		3	Procedure with slides
4	Preparation of cells and tissues: Squamous epithelium, Striated, Smooth and Cardiac Muscle		3	Live demo
5	Mitosis - Root tips,		3	Live demonstration
6	Meiosis - Grass hopper testis		3	Live demonstration
7	Cell Counts - Total count RBC & WBC of Human, Differential Count.		3	Live demonstration
8	Estimation of carbohydrate, proteins and lipids.		3	Live demonstration
9	Qualitative analysis of carbohydrates, protein and lipids		3	Live demonstration
Spotters				
10	pH meter, Centrifuge		3	Live demo with instruments
11	Spectrophotometer, Paper Chromatography		3	Live demo with instruments
12	Agarose Gel Electrophoresis Polyacrylamide Gel Electrophoresis		3	Live demo with instruments
13	DNA and RNA.		3	Comments with Image
14	Internal Practical Test		3	
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	Recall the operational methods and uses of microscopes, camera lucida, stage and ocular micrometers.	K2
CLO-2	Understand the cytological and biochemical techniques.	K3
CLO-3	Apply the knowledge to	K3
CLO-4	Analyse the preparation of cells and tissues, cell division and cell counts.	K4
CLO-5	Examine the quantitative and qualitative analysis of carbohydrate, proteins and lipids.	K4

Mapping with Programme Specific Outcomes

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

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

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

Semester III: Mapping of Courses with Programme Specific Outcomes

Mapping with Programme Specific Outcomes

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
Cell biology & Biochemistry	2	1	2				2	
Applied Entomology	2	1	2		1	3	3	
Major Practical-1II	1	1	1				2	

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

Semester III: Mapping of Course Outcomes with Programme Specific Outcomes

		PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
Cell biology & Biochemistry	CO-1	1		3	1	1			
	CO-2	1	1	3					
	CO-3	1	1	2					
	CO-4	1		3	2				
	CO-5	1		2					
Applied Entomology	CO-1	2	1		2		2		
	CO-2	1			1		2	3	
	CO-3	2					3		
	CO-4	1				2	2	3	
	CO-5	1	1	3		1		2	

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