

**St. Aloysius College (Autonomous), Jabalpur**  
**Department of Higher Education, Govt. of M.P.**  
**Under Graduate Syllabus for B.Sc.(Bio)**  
**As recommended by Central board of Studies in Zoology**  
**Class - B.Sc. II Semester**  
**(Session 2022-23)**

<b>Theory Syllabus</b>			
<b>Part A Introduction</b>			
<b>Programme- Certificate Course</b>	<b>Class: B.Sc</b>	<b>Sem -II Semester</b>	<b>Session: 2022-2023</b>
Subject: Zoology			
1.	Course Code	S1-ZOOL2T	
	Course Title	<b>Cell Biology, Reproductive biology and developmental biology</b>	
	Course Type (Core Course/Elective/Generic Elective/Vocational..)	Generic Elective	
	Pre-requisite (if any)	To study this course a student must have had the subject Biology in 12 <sup>th</sup> Class	
	Course Learning outcomes (CLO)	<p>Upon completion of the course students should be able to</p> <ol style="list-style-type: none"> <li>1. Develop deeper understanding of what life is and how it functions at cellular level</li> <li>2. Understand the nature and basic concepts of Cell biology, Reproductive and Developmental biology.</li> <li>3. Understand structure and functions of cell membrane and cellular organelles</li> <li>4. Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare.</li> <li>5. Understand the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multi-cellular organisms.</li> <li>6. Understand about the evolutionary development of various animals.</li> </ol>	
6	Credit Value	3	
7	Total Marks	MM 40+60	Min Passing Marks 35

<b>Part B Content of the course</b>		
<b>Total No. of Lectures – Tutorials- Practical (in hours per week): 2hours per week</b>		
<b>L-T-P:</b>		
<b>Unit I</b>	<b>Topics</b>	<b>No. of Lectures</b>
I	<p><b>Cell Biology</b></p> <p>1.1 Concept of Prokaryotic and Eukaryotic Cells, difference between Prokaryotic and Eukaryotic Cells</p> <p>1.2 Structure and functions of Plasma membrane</p> <p>1.3 Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, Ribosome and Lysosome</p> <p>1.4 Structure and functions of Nucleus</p> <p>1.5 Structure and functions of Chromosome and special type of chromosomes-Lampbrush and Polytene chromosome</p> <p>1.6 Cell cycle, Mitotic and Meiotic cell division and their significance</p> <p>Keywords/Tags: Prokaryote, Eukaryote, Cell organelles, Chromosomes, Cell Cycle</p>	13
II	<p><b>Reproductive Biology</b></p> <p>1.1 Structure of Male reproductive system of Lepus</p> <p>1.2 Structure of Female reproductive system of Lepus</p> <p>1.3 Histology of Testis, and Ovary of Lepus</p> <p>1.4 Gametogenesis - Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis</p> <p>1.5 Types of Eggs-based on amount and distribution of yolk with examples</p> <p>Keywords/Tags: Reproductive system, Gametogenesis, Sperms, Eggs</p>	12
III	<p><b>Recent Assisted Reproductive Techniques (ART)</b></p> <p>1. Stem cell-Types and their uses</p> <p>1.2 Gene bank, Sperm bank, Superovulation, Cryopreservation</p> <p>1.3 In Vitro Fertilization (IVF) and Embryo Transfer (ET), Zygote Intra Fallopian Transfer (ZIFT), Intracytoplasmic Sperm Injection (ICSI), MOET(multiple ovulation Embryo transfer )</p> <p>1.4 Placentation -Types, examples and functions</p> <p>1.5 Placenta Banking-Placenta preservation benefits</p> <p>Keywords/Tags: Gene bank, Sperm bank, Superovulation, IVF, ET, ZIFT, ICSI, Placenta banking</p>	10

IV	<p><b>Developmental Biology</b></p> <p>1.1 Fertilization; Process of fertilization  1.2 Embryonic development of frog up to the formation of three germinal layers  1.3 Fate map construction in frog.  1.4 Metamorphosis of Tadpole Larva  1.5 Parthenogenesis  1.6 Extra embryonic membranes of Chick: Formation and functions.</p> <p>Keywords/Tags: Fertilization, Frog embryology. Tadpole metamorphosis, Parthenogenesis</p>	10
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## Part C-Learning Resources

### Text Books, Reference Books, Other resources

#### Suggested readings

##### 1. Suggested readings:

1. Armugam, "A Text Book of Embryology", Saras Publication, 2005.
2. Balinsky, BI, "An Introduction to Embryology", Cengage Learning, 2012.
3. De Robertis, EDP, De Robertis, EMF, "Cell and Molecular Biology", Eighth edition, Lippincott, Williams & Wilkins, Philadelphia, 2006.
4. Gupta, PK, "Cell Biology, Genetics and Evolution", Rastogi
5. Haffner, L, "Human reproduction at a glance", BWL Publication, "Human Embryology", Publications, 2013.
6. Churchill Livingstone, 2001.
7. Powar, CB, "Cell Biology", Himalaya Publishing House, 2010.
8. Larsen, 8. Rastogi, VB, "Introduction to Cytology", KNRN Publication, 1988.
9. Rastogi, VB, "Animal Distribution and Developmental Biology", KNE2001. Publication, 2020.
10. Sastry, KV, Publications, 2018. "Endocrinology and Reproductive Biology",
11. Verma and Agarwal, "A Text Book of Cytology", S. Chand & Co., 1999.
12. Verma, PS, Agarwal, V, K. "Chordate Embryology", S. Chand & Co., 2000
13. Pardesi, K and Dubey, A., "Cell and Developmental Biology", Akhandpubli

#### Suggested equivalent online courses:

1. house, New Delhi, I edition, 2020.
14. <https://academic.oup.com>
15. <https://medineplus.gov>
16. <https://ncni.nlm.nih.gov>
17. <https://zoologylearningpoint.wordpress.com> [zoologyresources.com](https://zoologyresources.com)

sted equivalent online courses:

Swayam Online Courses <https://storage.googleapis.com/uniquecourses/online.html>

National Digital Library <https://ndl.iitkgp.ac.in/>

<b>Part B- Content of the Course</b>			
<b>Total No. of Lectures - Tutorials-Practical (in hours per week): 02 hours per week</b>			
<b>L-T-P:</b>			
<b>Unit</b>	<b>Topics</b>	<b>No. of lectures</b>	
1.	Spotting related to the cytology Prokaryote and Eukaryote Cell b. Stages of Mitotic cell division c. Stages of Meiotic cell division. d. Lamp brush Chromosome	15	
2.	Spotting related to Reproductive biology and Embryology  a. T.S. Testis of Mammal b. T.S. Ovary of Mammal c. Developmental stages of Frog embryology d. Developmental stages of Chick embryology		
3.	Squash preparation of onion root tip to understand the stages of Mitosis		
4.	Squash preparation of Grasshopper testis to understand the stages of Meiosis		
5.	Credit Value	3	
6.	Total Marks	MM 40+60	Min Passing Marks 35
Keywords/Tags: Stages of cell division, Stages of Embryonic development, Squash Preparation			
<b>Part C-Learning Resources</b>			
<b>Text Books, Reference Books, Other resources</b>			
<b>Suggested Readings:</b>			
1. Arumam, N. Nair, NC, Leelavathy, S. Pandian, NS, Murugan, T, Jayasurya, "Practical Zoology - Invertebrata", Volume-I. Saras Publication, 2013.			
2. Lal, SS. "A Text book of Practical Zoology - Invertebrates", Rastogi Publication, 2016			
3. Prakash, M, and Arora, CK. "Laboratory Animals". Anmol Publications, New Delhi, 1998			
4. Verma, PS, "A Manual of Practical Zoology - Invertebrates". S. Chand & Co., 2013.			
5. Virtual Labs ( <a href="https://www.vlab.co.in">https://www.vlab.co.in</a> )			

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Subject: Zoology			
1.	Course Code	S1-ZOOL2T	
	Course Title	<b>Cytology ,Reproductive biology and Embryology</b>	
	Course Type (Core Course/Elective/Generic Elective/Vocational)	Elective	
	Pre-requisite (if any)	To study this course a student must have had the subject Biology in 12 <sup>th</sup> Class	
	Course Learning outcomes (CLO)	<p>Upon completion of the course students should be able to</p> <ol style="list-style-type: none"> <li>1.The different stages of my topic and mitotic cell division and special types of chromosomes.</li> <li>2.Different stages of embryology</li> <li>3.Through squash preparation understand the stages of cell division and structure of polythene chromosome</li> <li>4.Enhance collaborative learning and communicating skill through the practical session team work, group discussion assignment and project</li> <li>.</li> <li>.</li> </ol>	
6	Credit Value	1	
7	Total Marks	MM 40+60	Min Passing Marks 35

Part D- Assessment and Evaluation

Suggested continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	20	Viva Voce on Practical	05
Attendance	10	Practical Record File	05
Assignments (Charts/Model/ Seminar/Rural Service/Technology Dissemination/ Report of Excursion/lab Visits/Survey/Industrial visit)	10		50
		Table work/Experiments	08
		Spotting of cytology	10
		Spotting of Reproductive	08
		Biology & Embryology	08
		Squash Preparation of onion root tip	08
		Squash Preparation of Grass hopper testis	08
<b>TOTAL</b>	<b>40</b>		<b>60</b>

Any Remarks/Suggestion: