



ST. ALOYSIUS COLLEGE (AUTONOMOUS), JABALPUR

Reaccredited 'A+' Grade by NAAC (CGPA:3.68/4.00)

College with Potential for Excellence by UGC

DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Science (B.Sc.)

Session – 2024-25

SUBJECT: ZOOLOGY

B.Sc. II Semester

Course Title -Cell Biology, Reproductive Biology and Developmental Biology

Core Course – Minor (Zoology)

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Develop deeper understanding of what life is and how it functions at cellular level	U, ANALYSE
CO 2	Understand the nature and basic concepts of Cell biology, Reproductive and Developmental biology.	U
CO 3	Understand structure and functions of cell membrane and cellular organelles	U
CO 4	Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare.	U, APPLY
CO 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.	U, CREATE
CO6	Understand about the evolutionary development of various animals.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks	Min Passing Marks
		Internal	External		
Theory	4	40	60	100	35
Practical	2	40	60	100	35
Total	6				



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Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exam (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exam (At the End of Semester)

Content of the Course

Theory Syllabus

No. of Lectures (in hours per week): 2 hours per week

Total No. of Lectures: 60 hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Cell Biology 1.1 Concept of Prokaryotic and Eukaryotic Cells, difference between Prokaryotic and Eukaryotic Cells 1.2 Structure and functions of Plasma membrane 1.3 Structure and functions of Golgi body, Mitochondria, Endoplasmic reticulum, Ribosome and Lysosome 1.4 Structure and functions of Nucleus 1.5 Structure and functions of Chromosome and special type of chromosomes-Lampbrush and Polytene chromosome 1.6 Cell cycle, Mitotic and Meiotic cell division and their significance Keywords/Tags: Prokaryote, Eukaryote, Cell organelles, Chromosomes, Cell Cycle.	13
II	Reproductive Biology 1.1 Structure of Male reproductive system of Lepus 1.2 Structure of Female reproductive system of Lepus 1.3 Histology of Testis, and Ovary of Lepus 1.4 Gametogenesis - Spermatogenesis and oogenesis, difference between spermatogenesis and oogenesis 1.5 Types of Eggs-based on amount and distribution of yolk with examples Keywords/Tags: Reproductive system, Gametogenesis, Sperms, Eggs	13



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III	Recent Assisted Reproductive Techniques (ART) 1.1 Stem Cell-Types and their uses 1.2 Gene bank, Sperm bank, Superovulation, Cryopreservation 1.3 In Vitro Fertilization (IVF) and Embryo Transfer (ET)), Zygote Intra Fallopian Transfer (ZIFT), Intracytoplasmic Sperm Injection (ICSI), MOET (Multiple ovulation embryo transfer) 1.4 Placentation -Types, examples and functions 1.5 Placenta Banking-Placenta preservation benefits Keywords/Tags: Gene bank, Sperm bank, Superovulation, IVF, ET, ZIFT, ICSI, Placenta banking	12
IV	Developmental Biology 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 Keywords/Tags: Fertilization, Frog embryology. Tadpole metamorphosis, Parthenogenesis	11
V	Embryonic Development of Chick 1.1 Structure of hen's egg. 1.2 Embryonic Development of chick embryo upto the formation of primitive streaks 1.3 Fate map construction in chick 1.4 Extra embryonic membranes of Chick: Formation and functions. Keywords/Tags: Hen's egg, Chick embryology, Fate map, Chick	11



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Text Books, Reference Books

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, P.K, "Cell Biology, Genetics and Evolution", Rastogi
5. Haffner, L, "Human reproduction at a glance", BWL Publication,
6. "Human Embryology", Publications, 2013. Churchill Livingstone, 2001.
7. Powar, C.B, "Cell Biology", Himalaya Publishing House, 2010.
8. Larsen, 8. Rastogi, VB, "Introduction to Cytology", KNRN Publication, 1988.
9. Rastogi, V.B, "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, P.S, Agarwal, V, K. "Chordate Embryology", S. Chand & Co., 2000
13. Pardesi, K and Dubey, A., 'Cell and Developmental Biology', Akhand public house ,New Delhi, India edition, 2020.

Suggested equivalent online courses/ Other resources:

13. <https://academic.oup.com>
14. <https://medineplus.gov>
15. <https://ncni.nlm.nih.gov>
16. <https://zoologylearningpoint.wordpress.com> zoologyresources.com
17. Swayam Online Courses <https://storage.googleapis.com/uniquecourses/online.html>
18. National Digital Library <https://ndl.iitkgp.ac.in/>



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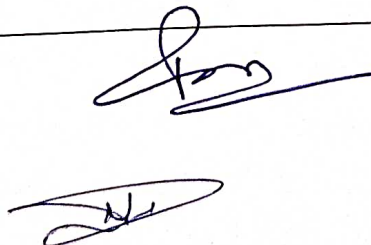
Practical Syllabus

Total No. of Lectures: 30 hrs.

Maximum Marks: 60

Unit	Topics	No. of lectures
1.	Spotting related to the cytology a. Prokaryote and Eukaryote Cell b. Stages of Mitotic cell division c. Stages of Meiotic cell division. d. Lamp brush Chromosome e. Study of Polytene Chromosome under Phase Contrast Microscope.	8
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 e. Malaria Antibody Test using ELISA Reader f. Calculation of phase percentage of stages of meiotic cell division under Phase Contrast Microscope g. Study of Sperm Morphology under Phase Contrast Microscope	10
3.	Squash preparation of onion root tip to understand the stages of Mitosis	3
4.	Squash preparation of Grasshopper testis to understand the stages of Meiosis	3
5.	Trypan Blue exclusion test of cell viability	3
6.	Squash preparation of salivary gland chromosome from Chironomus larva / Drosophila	3
Keywords/Tags: Stages of cell division, Stages of Embryonic development, Squash Preparation		


A. Saxena




Aman Singh



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Text Books, Reference Books, Other resources

1. Arumam, N. Nair, NC, Leelavathy, S. Pandian, N.S, Murugan, T, Jayasurya, "Practical Zoology - Invertebrata", Volume-I. Saras Publication, 2013.
2. Lal, S.S. "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, P.S, "A Manual of Practical Zoology - Invertebrates". S. Chand & Co., 2013.
5. Virtual Labs (<https://www.vlab.co.in>)

SCHEME OF PRACTICAL EXAMINATION

Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz	10	Viva Voce on Practical	10
Attendance	10	Practical Record File	10
Assignments (Charts/Model/ Seminar/Rural Service/Technology Dissemination/ Report of Excursion/lab Visits/Survey/Industrial visit	20	Table Work/Experiments	40
		1. Spotting of Cytology	08
		2. Spotting of Reproductive Biology & Embryology	08
		3. Squash Preparation of onion root tip	06
		4. Squash preparation of Grasshopper testis	06
		5. Cell Viability Test	06
		6. Salivary gland chromosome preparation	06
TOTAL	40		60