



बिरसा मुंडा ट्रायबल युनिवर्सिटी

Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

School of Science

M.Sc. (ZOOLOGY) Programme

Subject Code & Name: - MS02CZOO03, Practical Based on MS02CZOO01
& MS02CZOO02

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				Internal		External	
L	T	P	Total	TH	PWE	TH	PWE
--	--	4	4	--	50%	--	50%

Programme Name	M.Sc. ZOOLOGY
Semester	II
Course Code	MS02CZOO03
Course Title	Practical based on MS02CZOO01 & MS02CZOO02
Course Content Type (Th./Pr.)	Practical
Course Credit	4
Sessions+ Lab. Per Week	8
Total Teaching/Lab. Hours	60 Hours
* 2 Laboratory = 1 Session	

Learning Objectives

- Develop skills in vertebrate identification, classification and comparative anatomy.
- Understand structural, functional and developmental organization of vertebrates.
- Apply embryological, phylogenetic and anatomical techniques in zoological studies.

Prerequisites (if any)

- Basic knowledge of Chordate Zoology and Animal Diversity.
- Fundamental understanding of Vertebrate Anatomy and Embryology.
- Familiarity with laboratory equipment, microscopes and biological specimens.
- Basic understanding of evolutionary and developmental concepts.

Learning Outcomes

On the Completion of this course, students will able to:

- Classify vertebrates and explain their evolutionary relationships.
- Interpret structural and functional adaptations of major vertebrate organ systems.
- Demonstrate practical skills in comparative anatomy, embryology and developmental biology.



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Detailed Contents

List of Practical (Practical are demonstrated using charts, models and multimedia videos)

1. Study of classification of lower vertebrates (Protochordata, Cyclostomata, Pisces and Amphibians)
2. Study of classification of higher vertebrates (Reptiles, Aves and Mammals)
3. Comparative study of integument and integumentary derivatives through specimens, models and charts: Scales, Feathers, Hair, Horns and antlers, Claws, nails and hoofs
4. Comparative study of alimentary canal in fish, amphibian, reptile, bird and mammal
5. Comparative study of digestive glands (liver and pancreas) in vertebrates
6. Comparative study of respiratory organs: Gills of fishes, and Lungs of amphibians, reptiles, birds and mammals
7. Comparative study of heart in fishes, amphibians, reptiles, birds and mammals
8. Comparative study of aortic arches in vertebrates through diagrams and models
9. Comparative study of brain of fish, amphibian, reptile, bird and mammal
10. Comparative study of vertebrate kidneys: Pronephros, Mesonephros and Metanephros
11. Study of neoteny and paedogenesis using specimens, photographs and case studies
12. Study of hibernation and aestivation in vertebrates
13. Preparation of cladograms/phylogenetic trees depicting vertebrate evolutionary relationships
14. Study of different types of eggs based on yolk quantity and distribution
15. Study of different types of cleavage based on cleavage plane
16. Study of stages of cleavage, morula and blastula
17. Study of gastrulation in Amphioxus, Frog and Chick
18. Study of Drosophila developmental stages
19. Study of fate maps and embryonic axis formation
20. Study of amphibian metamorphosis
21. Demonstration of IVF and assisted reproductive technologies
22. Study of congenital abnormalities and teratogenic effects
23. Demonstration of regeneration in Hydra, Planaria and Salamander
24. Microscopic observation of chick embryo developmental stages

60 Hours



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Text Book(s)

1. Chordate Zoology by E. L. Jordan and P. S. Verma, S. Chand & Company Ltd.
2. Chordate Zoology by R. L. Kotpal, Rastogi Publications.
3. Biology of Chordates by P. S. Verma and V. K. Agarwal, S. Chand & Company Ltd.
4. Textbook of Vertebrate Zoology by S. N. Prasad and V. Kashyap, New Age International Publishers.
5. Chordate Embryology by P. S. Verma and V. K. Agarwal, S. Chand & Company Ltd.
6. Embryology by N. Arumugam, Saras Publication.
7. Developmental Biology by Scott F. Gilbert and Michael J. F. Barresi, Oxford University Press.
8. Practical Zoology: Chordates by S. S. Lal, Rastogi Publications.

Reference Books

1. Vertebrates: Comparative Anatomy, Function, Evolution by Kenneth V. Kardong, Mc. Graw-Hill Education.
2. The Vertebrate Body by Alfred Sherwood Romer and Thomas S. Parsons, Saunders College Publishing.
3. Comparative Anatomy of Vertebrates, by George C. Kent and Larry Miller, McGraw-Hill Education.
4. Principles of Development by Lewis Wolpert, Cheryll Tickle and Alfonso Martinez Arias, Oxford University Press.
5. Developmental Biology by Scott F. Gilbert, Sinauer Associates.
6. Essential Developmental Biology by Jonathan M. W. Slack, Wiley-Blackwell.
7. Life of Vertebrates by J. Z. Young, Oxford University Press.
8. Functional Anatomy of the Vertebrates: An Evolutionary Perspective by Karel F. Liem, Warren F. Walker Jr. and Lance Grande, Brooks/Cole.

Web Resources

1. Animal Diversity Web – <https://animaldiversity.org>
2. Understanding Evolution – <https://evolution.berkeley.edu>
3. Developmental Biology Interactive Resource – <https://devbio.com>
4. e-PG Pathshala – <https://epgp.inflibnet.ac.in>
5. NPTEL – <https://nptel.ac.in>
6. NCBI Bookshelf – <https://www.ncbi.nlm.nih.gov/books>

Required Software(s) (if any)

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L:: Lecture, T:: Tutorial , P::Practical

PWE:: Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

