

Programme/Class: Degree	Year: Third	Semester: Fifth
Subject: ZOOLOGY		
Course Code: B050501T	Course Title: Diversity of Non-Chordates and Economic Zoology	
Course outcomes: The student at the completion of the course will be able to: The student at the completion of the course will be able to: <ul style="list-style-type: none"> • demonstrate comprehensive identification abilities of non-chordate diversity • explain structural and functional diversity of non-chordate • explain evolutionary relationship amongst non-chordate groups • Get employment in different applied sectors • Students can start their own business i.e. self employments. • Enable students to take up research in Biological Science 		
Credits: 4	Core: Compulsory	
Max. Marks: 25+75	Min. Passing Marks: as per rules	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 4-0-0		
Unit	Topic	Total No. of Lectures (60)
I	Protozoa to Coelenterate <ul style="list-style-type: none"> • Protozoa – <i>Paramecium</i> (Morphology and Reproduction) • Porifera – <i>Sycon</i>(Canal System) • Coelenterata – <i>Obelia</i> (Morphology and Reproduction) 	7
II	Ctenophora to Nematelminthes <ul style="list-style-type: none"> • Ctenophora - Salient features • Platyhelminthes - <i>Taenia</i> (Tape worm) (Morphology and Reproduction) • Nematelminthes –<i>Ascaris lumbricoides</i> (Morphology and Reproduction) 	7
III	Annelida <ul style="list-style-type: none"> • Annelida –<i>Hirudinaria</i> (Leech) (Morphology and Reproduction) 	8
IV	Arthropoda <ul style="list-style-type: none"> • Arthropoda – <i>Palaemon</i> (Prawn) (Morphology, Appendages, Nervous System and Reproduction) 	8
V	Mollusca to Hemichordata <ul style="list-style-type: none"> • Mollusca – <i>Pila</i>(Morphology, Shell, Respiration, Nervous System and Reproduction) • Echinodermata –<i>Pentaceros</i> (Morphology and Water Vascular System) 	8

VI	Vectors and pests Life cycle and their control of following pests: Gundhi bug, Sugarcane leafhopper, Rodents. Termites and Mosquitoes and their control	8
VII	Economic Zoology-1 Animal breeding and culture: Pisciculture	7
VIII	Economic Zoology- 2 Sericulture, Apiculture, Lac-culture, Vermiculture	7
Suggested Readings:		
<ol style="list-style-type: none"> 1. Barnes et al (2009). The Invertebrates: A synthesis. Wiley Backwell 17 2. Hunter: Life of Invertebrates (1979, Collier Macmillan) 3. Marshall: Parker & Haswell Text Book of Zoology, Vol. I (7th ed 1972, Macmillan) 4. Moore: An Introduction to the Invertebrates (2001, Cambridge University Press) 5. Brusca and Brusca (2016) Invertebrates. Sinauer 6. Jan Pechenik (2014) Biology of the invertebrates. McGraw Hill 7. Neilsen (2012). Animal Evolution: Interrelationships amongst living Phyla. Oxford 8. Parasitology- Chatterjee 9. Parasitology- Chakraborty 10. Thomos C. Chung. General Parasitology. Hardcourt Brace and Co. Ltd. Asia, New Delhi. 11. Gerard D. Schmidt and Larry S Roberts. Foundations of Parasitology. McGraw Hill. 12. Bisht. D.S., <i>Apiculture</i>, ICAR Publication. 13. Singh S., <i>Beekeeping in India</i>, Indian council of Agricultural Research, New Delhi. 14. Jhingran. V.G. Fish and fisheries in India., 15. Khanna. S.S, An introduction to fishes 16. Boyd. C.E. & Tucker. C.S, Pond aquaculture water quality management, 17. Biswas. K.P, Fish and prawn diseases, 18. Pedigo, L.P. (2002). <i>Entomology and Pest Management</i>, Prentice Hall. 19. Lee, Earthworm Ecology 20. Stevenson, Biology of Earthworms 21. Destructive and Useful Insects by C. L. Metcalf 22. Sericulture for Rural Development : Hanumappa (1978), Himalaya Publication, 23. Sericulture in India Sarkar, D.C. (1988), CSB, Bangalore. <p style="text-align: center;">Course Books published in Hindi may be prescribed by the Universities and Colleges</p>		
This course can be opted as an elective by the students of following subjects:		
The eligibility for this paper is 10+2 with Biology as one of the subject		
Suggested Continuous Evaluation Methods:		
House Examination/Test: 10 Marks		
Written Assignment/Presentation/Project / Term Papers/Seminar: 10 Marks		
Class performance/Participation: 5 Marks		
Further Suggestions: None		

At the End of the whole syllabus any remarks/ suggestions:

Programme/Class: Degree	Year: Third	Semester: Fifth
Subject: ZOOLOGY		
Course Code: B050502T	Course Title: Diversity of Chordates and Comparative Anatomy	
Course outcomes: The student at the completion of the course will be able to: <ul style="list-style-type: none"> • Demonstrate comprehensive identification abilities of chordate diversity • Explain structural and functional diversity of chordates • Explain evolutionary relationship amongst chordates • Take up research in biological sciences. 		
Credits: 4	Core Compulsory/Elective	
Max. Marks: 25+75	Min. Passing Marks: as per rules	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 4-0-0		
Unit	Topic	Total No. of Lectures (60)
I	Origin of Chordates & Hemichordata <ul style="list-style-type: none"> • Origin of Chordates. Classification of Phylum Chordata upto the class. • Hemichordata: General characteristics, classification and detailed study of <i>Balanoglossus</i>(Habit and Habitat, Morphology, Anatomy, Physiology and Development). 	6
II	Cephalochordata and Urochordata <ul style="list-style-type: none"> • Cephalochordata : General characteristics, classification and detailed study of <i>Branchiostoma (Amphioxus)</i> (Habit and Habitat, Morphology, Anatomy, Physiology). • (ii)Urochordata : General characteristics, classification and detailed study of <i>Herdmania</i>(Habit and Habitat, Morphology, Anatomy, Physiology and Post Embryonic Development). 	6
III	Classification and General Characteristics of Vertebrates <ul style="list-style-type: none"> • General characters and Classification of different classes of vertebrates (Pisces, Amphibia, Reptilia, Aves, Mammalia) up to the order with examples. • Poisonous and Non Poisonous Snakes and biting mechanism. • Neoteny and Paedogenesis • Migration in birds • Dentition in Mammals 	8
IV	Comparative Anatomy and Physiology of Vertebrates Integumentary System Structure, functions and derivatives of integument Skeletal System Overview of axial and appendicular skeleton, Jaw suspensorium, Visceral arches	8
V	Digestive System Alimentary canal and associated glands, dentition	

		8
VI	Respiratory System Skin, gills, lungs and air sacs; Accessory respiratory organs	8
VII	Circulatory System General plan of circulation, evolution of heart and aortic arches Urinogenital System Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri	8
VIII	Nervous System Comparative account of brain Autonomic nervous system, Spinal cord, Cranial nerves in mammals Sense Organs Classification of receptors Brief account of visual and auditory receptors in man	8
Suggested Readings:		
<ol style="list-style-type: none"> 1. Harvey et al: The Vertebrate Life (2006) 2. Colbert et al: Colbert's Evolution of the Vertebrates: A history of the backboned animals through time (5th ed 2002, Wiley - Liss) 3. Hildebrand: Analysis of Vertebrate Structure (4th ed 1995, John Wiley) 4. Kenneth V. Kardong (2015) Vertebrates: Comparative Anatomy, Function, Evolution McGraw Hill 5. McFarland et al: Vertebrate Life(1979, Macmillan Publishing) 6. Parker and Haswell: TextBook of Zoology, Vol. II (1978, ELBS) 7. Romer and Parsons: The Vertebrate Body (6th ed 1986, CBS Publishing Japan) 8. Young: The Life of vertebrates (3rd ed 2006, ELBS/Oxford) 9. Weichert C.K and William Presch (1970). Elements of Chordate Anatomy, Tata McGraw Hills 		
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This course can be opted as an elective by the students of following subjects:		
The eligibility for this paper is 10+2 with Biology as one of the subject		
Suggested Continuous Evaluation Methods:		
House Examination/Test: 10 Marks		
Written Assignment/Presentation/Project / Term Papers/Seminar: 10 Marks		
Class performance/Participation: 5 Marks		
Further Suggestions: None		

At the end of the whole syllabus any remarks/suggestions:

Programme/Class: Degree	Year: Third	Semester: Fifth
Subject: ZOOLOGY		
Course Code: B050503P	Course Title: Lab on Virtual Dissection, Anatomy, Economic Zoology and Parasitology	
Course outcomes: The student at the completion of the course will be able to: <ul style="list-style-type: none"> • demonstrate comprehensive identification abilities of chordate and non- chordates diversity • explain structural and functional diversity of chordates and non- chordates • explain evolutionary relationship amongst chordates and non- chordates • Generate self employment • Enable students to take up research in biological sciences. 		
Credits: 2	Core: Compulsory	
Max. Marks: 25+75	Min. Passing Marks: as per rules	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 0-0-4		
Unit	Topic	Total No. of Lectures (60)
I	Study of animal specimens of various animal phyla. 1.To prepare permanent stained slide of septal nephridia of earthworm. 2.To take out the nerve ring of earthworm. 3.To take out hastate plate from <i>Palaemon</i> .	15
II	1.Study of animal specimens of various animal phyla 2. Study on use and ethical handling of model organisms (Mice, rats, rabbit and pig). 3. To prepare stained/unstained slide of placoid scales. 1. Comparative study of bones of different vertebrates. 2. Comparative study of histological slides of different tissues of vertebrates.	15
III	1. Permanent Preparation of: <i>Euglena</i> , <i>Paramecium</i> 2. Study of prepared slides/specimens of <i>Entamoeba</i> , <i>Giardia</i> , <i>Leishmania</i> , <i>Trypanosoma</i> , <i>Plasmodium</i> , <i>Fasciola</i> , <i>Cotugnia</i> , <i>Taenia</i> , <i>Rallietina</i> , <i>Polystoma</i> , <i>Schistosoma</i> , <i>Echinococcus</i> , <i>Enterobius</i> , <i>Ascaris</i> and <i>Ancylostoma</i> 3. Permanent Preparation of <i>Cimex</i> (bed bug)/ <i>Pediculus</i> (Louse), <i>Haematopinus</i> (cattle louse), fresh water annelids, arthropods; and soil arthropods. 4. Larval stages of helminths and arthropods. 5. Permanent mount of wings, mouth parts and developmental stages of mosquito and house fly. Permanent preparation of ticks/ mites, abdominal gills of aquatic insects viz. Chironomus larva, dragonfly and mayfly nymphs, preparation of antenna of housefly. 6. Identification of pests. 7. Life history of silkworm, honeybee and lac insect. 8. Different types of important edible fishes of India.	15

	<p>9. Slides of plant nematodes.</p> <p>10. Study of an aquatic ecosystem, its biotic components and food chain.</p> <p>11. Project Report/ model chart making.</p> <p>12. Dissections : through multimedia / models</p> <p>13. Cockroach : Central nervous system</p> <p>14. Wallago: Afferent and efferent branchial vessels, Cranial nerves, Weberian ossicles.</p>	
IV	<p>Virtual Labs (Suggestive sites)</p> <p>https://www.vlab.co.in</p> <p>https://zoologysan.blogspot.com</p> <p>www.vlab.iitb.ac.in/vlab</p> <p>https://www.vlab.co.in</p> <p>https://zoologysan.blogspot.com</p> <p>www.vlab.iitb.ac.in/vlab</p> <p>www.onlinelabs.in</p> <p>www.powershow.com</p> <p>https://vlab.amrita.edu</p> <p>https://sites.dartmouth.edu</p>	15
<p>Suggested Readings:</p> <ol style="list-style-type: none"> 1. Harvey et al: The Vertebrate Life (2006) 2. Colbert et al: Colbert's Evolution of the Vertebrates: A history of the backboned animals through time (5th ed 2002, Wiley - Liss) 3. Hildebrand: Analysis of Vertebrate Structure (4th ed 1995, John Wiley) 4. Kenneth V. Kardong (2015) Vertebrates: Comparative Anatomy, Function, Evolution McGraw Hill 5. McFarland et al: Vertebrate Life (1979, Macmillan Publishing) 6. Parker and Haswell: TextBook of Zoology, Vol. II (1978, ELBS) 7. Romer and Parsons: The Vertebrate Body (6th ed 1986, CBS Publishing Japan) 8. Young: The Life of vertebrates (3rd ed 2006, ELBS/Oxford) 9. Barnes et al (2009). The Invertebrates: A synthesis. Wiley Backwell 17 10. Marshall: Parker & Haswell Text Book of Zoology, Vol. I (7th ed 1972, Macmillan) 11. Moore: An Introduction to the Invertebrates (2001, Cambridge University Press) 12. Brusca and Brusca (2016) Invertebrates. Sinauer 13. Jan Pechenik (2014) Biology of the invertebrates. McGraw Hill 14. Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia Publishing Home 15. Robert Leo Smith Ecology and field biology Harper and Row publisher 16. Handbook of Practical Sericulture :Ullal, S.R. and Narasimhanna, M.N. (1987), Central Silk Board Publication, Bangalore. 17. Prost, P. J. (1962). <i>Apiculture</i>. Oxford and IBH, New Delhi. 18. Bisht. D.S., <i>Apiculture</i>, ICAR Publication. 19. Singh S., <i>Beekeeping in India</i>, Indian council of Agricultural Research, New Delhi. 20. Ullal S.R. and Narasimhanna, M.N. Handbook of Practical Sericulture: CSB, Bangalore 21. Jolly. M. S. Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore. 22. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co. 23. Santanam, B. <i>et al</i>, A manual of freshwater aquaculture 24. Boyd. C.E. & Tucker. C.S, Pond aquaculture water quality management 25. Pedigo, L.P. (2002). <i>Entomology and Pest Management</i>, Prentice Hall. 26. Ranganathan L.S, Vermicomposting technology- soil health to human health 		

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This course can be opted as an elective by the students of following subjects:

The eligibility for this paper is 10+2 from Arts/Commerce/Science

Suggested Continuous Evaluation Methods:

House Examination/Test: 10 Marks

Written Assignment/Presentation/Project / Term Papers/Seminar: 10 Marks

Class performance/Participation: 5 Marks

Further Suggestions: None

At the end of the whole syllabus any remarks/ suggestions: University must ensure incorporation of all 04 units including virtual labs in practical evaluation.