UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS WITH EFFECT FROM 2023-2024

LAB COURSE - SEMESTER – I & II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
121C21	**INVERTEBRATA AND CHORDATA – PRACTICAL-I**	Core		-	Y	-	5	4+3	40	60	100

Learning Objectives	
CO1	To appreciate different groups of invertebrate animals by observing their external characteristics and to understand their organ systems by way of dissections.
CO2	To appreciate different groups of Chordate animals by observing their external characteristics and to understand their organ systems by way of dissections.
CO3	To dissect and mount various body parts and to study the various functional details of invertebrates
CO4	To dissect and mount various body parts and to study the various functional details of chordates.
CO5	To identify the different groups of Invertebrate and chordate animals and to gather adequate knowledge of their skeletal system.

UNIT	Details	No. of Hours	Course Objectives
I	**INVERTEBRATA** **Major Dissection :** Cockroach: Nervous system, Digestive System. / Earth worm- Nervous System/ Prawn: Nervous system (including Appendages).	12	CO1
II	**CHORDATA:** **MajorDissection** : Fish- External features, Digestive system.	12	CO2
III	**INVERTEBRATA** **Mounting:** Earthworm: Body setae, Prawn: Appendages. Mouth parts – Housefly, cockroach and Mosquito	12	CO3
IV	**CHORDATA** **Mounting**: Fish: Placoid and Cycloid scales,	12	CO4

V	**SPOTTERS** A. **Classify giving reasons up to order:** 1. *Paramecium* 2. *Scypha* 3. *Obelia* 4. *Taenia solium* 5. *Ascaris* 6. *Neanthes* 7. *Penaeus* 8. *Asterias* 9. *Balanoglossus* 10. *Amphioxus* 11. *Scoliodon sorrakowah* 12. *Rana hexadactyla* 13. *Calotes versicolor* 14. *Columba livia* 15. *Oryctolagus cuniculus* **B- Draw labelled sketches:** 16. *Obelia* medusa 17. *Nereis* T.S 18. Bipinnaria larva 19. *Amphioxus* T.S 20. Quill feather **C. Comment on biological significance:** 21. *Entamoeba* 22. *Paramecium*-conjugation 23. *Plasmodium* 24. *Ascaris* 25.Heteronereis 26. *Peripatus* 27. Nauplius larva 28. *Sacculina* on crab 29. Sea anemone on hermit crab 30. *Vipera russelli* 31. Bat **D- Relate structure and function:** 32. Sponge-spicules 33. Sponge-gemmule *34.Taenia*-scolex *35.Neanthes*-parapodium *36. Penaeus*-petasma 37. Starfish-tubefoot		CO5

	38. Snake-poison apparatus 39. Quill feather **E. Osteology/palate in Birds/Dentition** **Osteology** **FROG** 40. Skull and lower jaw 41. Vertebral column 42. Pectoral girdle 43. Pelvic girdle 44. Forelimb 45. Hindlimb **Palate in Birds** 46. Pigeon-palate 47. Crow-palate 48. Duck-palate **Dentition** 49. Rabbit-dentition 50. Dog-dentition		
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Compare and distinguish the dissected internal organs of lower animals.	PO1
CO2	Compare and distinguish the dissected internal organs of Chordates	PO1, PO3
CO3	Prepare and develop the mounting procedure of economically important invertebrates.	PO6, PO8
CO4	Prepare and develop the mounting procedure of economically important Chordates	PO6, PO8
CO5	Identify and label the external features of different groups of invertebrate and chordate animals.	PO1,PO3, PO8

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Text Books (Latest Editions)	
1.	Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
2.	Ganguly, Sinha an d A dhikari , 2 0 11 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
3.	Sinha, Chatterjee and Chattopadhyay, 2 0 1 4. Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.
4.	Lal ,S. S, 2016 . Practical Zoology Invertebrate, Rastogi Publications.
5.	Verma, P. S. 2010. A Manual of Practical Zoology: Invertebates, S Chand, 4 97pp.
6.	Lal S S, 2009. Practical Zoology Vertebrate, Rajpal and Sons Publishing, 484pp.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science.
2.	Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition. Holt Saunders International Edition.
3.	Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*. II Edition, E.L.B.S. and Nelson
4.	Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.
5.	Lal, S.S. 2005. A text Book of Practical Zoology: Invertebrate, Rastogi, Meerut
Web Resources	
1.	https://nbb.gov.in/
2.	http://www.agshoney.com/training.htm
3.	https://icar.org.in/
4.	http://www.csrtimys.res.in/
5.	http://csb.gov.in/
	https://iinrg.icar.gov.in/
	https://www.nationalgeographic.com/animals/invertebrates/

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Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M		S					
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong(3) **M-Medium (2)** **L-Low (1)**