

**ST JOSEPH'S UNIVERSITY**

**BENGALURU-27**



**DEPARTMENT OF ZOOLOGY**  
**SEP- SYLLABUS FOR UNDERGRADUATE**  
**PROGRAMME**

From 2024 onwards

**SEMESTER - I**  
**SUMMARY OF CREDITS**

DEPARTMENT OF ZOOLOGY (Undergraduate) (2024 onwards)								
<b>Semester I</b>	<b>Code Number</b>	<b>Title</b>	<b>No of hours of instructions</b>	<b>Number of hours of teaching per week</b>	<b>Number of credits</b>	<b>Continuous Assessment (CA) Marks</b>	<b>End semester marks</b>	<b>Total marks</b>
Theory	ZO 124	<b>INVERTEBRATE ZOOLOGY</b>	45	3	3	40	60	100
Practical	ZO 1P124	<b>INVERTEBRATE ZOOLOGY - PRACTICAL</b>	30	3	2	25	25	50

<b>CORE COURSES (CC)</b>	
<b>Course Title</b>	<b>Code Number</b>
Invertebrate Zoology	ZO 124
Invertebrate Zoology – Practical	ZO 1P124

## COURSE CONTENT

Semester	I
Paper Code	ZO 124
Paper Title	INVERTEBRATE ZOOLOGY
Number of teaching hours per week	3
Total number of teaching hours per semester	45
Number of credits	3

### OBJECTIVE

To explain the classification, basic structural and functional aspects of Animal diversity in Invertebrates

### COURSE OUTCOME

At the end of the course the student should be able to:

- Understand the criteria for classification
- Comprehend the International rules and different systems of animal nomenclature
- Learn and appreciate the diversity, distinguishing features and functional aspects of different Invertebrate phyla.
- Identify the resemblance and evolutionary significance of larval forms across the phylum Annelida, Arthropoda and Echinodermata.

<b>INVERTEBRATE ZOOLOGY</b>	<b>45 HOURS</b>
<b>Unit I: INTRODUCTION</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>• Highlights of invertebrate origin</li> <li>• Systematics- Binomial and Trinomial nomenclature</li> <li>• International Rules of Zoological nomenclature (ICZN)</li> </ul>	3 hr
Criteria employed in classification <ul style="list-style-type: none"> <li>• Organization, symmetry, Germ layers.</li> <li>• Acoelom, Pseudocoelom and Eucoelom</li> <li>• Segmentation, Metamerism and Cephalization</li> <li>• Modern taxonomic methods</li> </ul>	2 hr
<b>Unit II: ANIMAL-LIKE PROTISTS</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification up to classes</li> <li>• <u>Special emphasis on class characteristics with suitable examples (Self-study)</u></li> </ul>	1 hr 1 hr
<ul style="list-style-type: none"> <li>• Reproduction in Protozoans- Asexual reproduction: Binary fission, Multiple fission, Plasmotomy, budding. Sexual reproduction: Conjugation in <i>Paramecium caudatum</i>.</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Locomotion and Nutrition in Protozoans</li> </ul>	2 hr
<b>Unit III: PORIFERA</b>	<b>4 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Canal system - Types, canal system in Sycon and functions</li> <li>• Cell types and Skeleton in Sponges - <u>Spicules and spongin fibres (Self-study)</u></li> </ul>	3 hr
<b>Unit IV: CNIDARIA</b>	<b>4 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Type study: External features and life cycle of Aurelia</li> <li>• Corals- types of corals and theories of coral reef formation - Daly's theory</li> </ul>	3 hr
<b>Unit V: HELMINTHES</b>	<b>4 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Regeneration in Planaria (<i>Dugesia</i>) - Child's axial gradient theory</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Parasitic adaptations in tapeworm and liver fluke.</li> <li>• <u><i>Ascaris lumbricoides</i> and <i>Ancylostoma duodenale</i> (Self-study)</u></li> </ul>	2 hr
<b>Unit VI: ANNELIDA</b>	<b>6 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	2 hr

<ul style="list-style-type: none"> <li>• Reproduction and development: Nereis and Heteronereis- Atoke and epitoke. <u>Trochophore larva and its phylogenetic significance (Self-study)</u></li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Earthworm: morphology and digestive system</li> </ul>	2 hr
<b>Unit VII: ARTHROPODA</b>	<b>7 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Unique features and systematic position of Peripatus.</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Larval forms in crustaceans- Nauplius, Metanauplius, Protozoa, Zoea, Mysis.</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Metamorphosis- Types and neuroendocrine regulation</li> </ul>	2 hr
<b>Unit VIII: MOLLUSCA</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> <li>• Torsion and coiling in Gastropods</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Freshwater mussel- externals, C.S. of shell and respiratory system.</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• <u>Structure and function of foot in – Neopilina, Chiton, Mytilus, Pila, Dentalium and Octopus (Self-study)</u></li> </ul>	1 hr
<b>Unit IX: ECHINODERMATA AND MINOR PHYLA</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>• Distinguishing features and classification, up to classes</li> <li>• Special emphasis on class characteristics with suitable examples</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Type study: Water vascular system in starfish</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• <u>Echinoderm larval forms: Bipinnaria larva and its phylogenetic significance (Self-study)</u></li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Concept of Minor phyla, List of minor phyla with examples</li> <li>• Salient features and affinities of Rotifers</li> </ul>	1 hr

**NOTE: 6 hours of self-study assigned from the above units.**

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- Robert, D.B. (1980) Invertebrate zoology. Holt Saunders international editions 4<sup>th</sup> edition.
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- Veer, B.R. (2021) Parker and Haswell Textbook of zoology invertebrates. Medtech Science Press 8<sup>th</sup> edition.

## Pedagogy

- **Teaching methods:** Lecture/ Presentation/ videos/ models.
- **Learning activities:** Presentation/ group discussion/ Seminar
- **Learning assessment:** Assignment/ Term Papers/ Test

## Formative assessment

Assessment	Weightage in Marks
House Examination/Test – Mid semester test	20
Written Assignment/Presentation/Project /Seminar – I- CA-1	10
Written Assignment/Presentation/Project /Seminar – II- CA-II	10
<b>Total</b>	<b>40</b>

## End semester question paper pattern

Questions	With choices	Total mark
1 mark	10 x 1	10
5 marks	4 x 5 (6 questions)	20
10 marks	3 x 10 (5 questions)	30
	<b>Total</b>	<b>60</b>

## Course Content - Practical

Semester	I
Paper Code	ZO 1P124
Paper Title	<b>INVERTEBRATE ZOOLOGY – PRACTICAL</b>
Number of Laboratory hours per week	3
Total number of laboratory hours per semester	30
Number of credits	2

### OBJECTIVE

To impart practical knowledge on systematics, morphology, anatomy of invertebrates and reinforce the basic laboratory skills including microscopy, dissection and observation of animal diversity.

### COURSE OUTCOME

At the end of the course the student should be able to:

- Identify the systematic position of selected invertebrates through observation of preserved specimens.
- Describe the external morphology and biological significance of invertebrates.
- Analyse the different taxonomic groups based on anatomy and structural arrangements.
- Identify the appendages of prawn and a thorough understanding of its body plan.
- Describe the external morphology of *Drosophila melanogaster*
- Comprehend the organ systems in *Drosophila melanogaster* larval stages

Unit	Practical course content
I	<b>PROTOZOA</b> <ul style="list-style-type: none"> <li>• <b>Slides:</b> <i>Euglena</i>, <i>Entamoeba</i>, <i>Trypanosoma</i>, <i>Plasmodium</i>, <i>Paramecium</i> – w.m., /conjugation, <i>Vorticella</i>, <i>Noctiluca</i></li> </ul>
II	<b>PORIFERA &amp; CNIDARIA</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> <i>Sycon</i>, <i>Hyalonema</i>, <i>Euplectella</i>, <i>Hydra</i>, <i>Physalia</i>, <i>Aurelia</i>, Sea anemone and Corals-<i>Fungia</i>, <i>Astrea</i>, <i>Alcyonium</i></li> </ul>



	<ul style="list-style-type: none"> <li>• <b>Slides:</b> Ephyra larva, T. S. of sea anemone, Spicules and Gemmule</li> </ul>
III	<b>HELMINTHES</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> <i>Planaria</i>, Tapeworm Liverfluke, male roundworm, female roundworm</li> <li>• <b>Slides:</b> T. S. of male roundworm, T. S. of female roundworm, Scolex</li> </ul>
IV	<b>ANNELIDA</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> <i>Nereis</i>, Heteronereis, <i>Chaetopterus</i>, <i>Aphrodite</i>, <i>Arenicola</i>, <i>Sabella</i>.</li> <li>• <b>Slides:</b> Parapodium, Trochophore larva, Earthworm (T.S. passing through the typhlosolar region).</li> </ul>
V	<b>ARTHROPODA</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> <i>Peripatus</i>, <i>Limulus</i>, Centipede, Millipede, <i>Apis</i>, Silk moth</li> <li>• <b>Slides:</b> Nauplius larva, Mysis Larva</li> </ul>
VI	<b>MOLLUSCA</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> <i>Chiton</i>, <i>Cypraea</i>, Pearl Oyster, <i>Haliotis</i>, <i>Dentalium</i>, <i>Nautilus</i>, <i>Sepia</i>, Cuttle bone, Octopus.</li> </ul>
VII	<b>ECHINODERMATA</b> <ul style="list-style-type: none"> <li>• <b>Spotters:</b> Star fish, Brittle star, Sea lily, Sea urchin, Cake urchin, Sea cucumber.</li> <li>• <b>Slides:</b> Pedicellaria, Bipinnaria larva.</li> </ul>
VIII	<b>TYPE STUDY- I</b> <ul style="list-style-type: none"> <li>• Brain and digestive system of <i>Drosophila melanogaster</i> larvae</li> </ul>
IX	<b>TYPE STUDY - II</b> <ul style="list-style-type: none"> <li>• Nervous system of Prawn</li> <li>• Mounting of Prawn appendages</li> </ul>
X	<ul style="list-style-type: none"> <li>• Collection and study of external morphology of <i>Drosophila melanogaster</i> – Body segments, bristle and ommatidia</li> </ul>

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## Pedagogy

- **Teaching methods:** Lecture/ Presentation/ videos/models.
- **Learning activities:** Identification, type study and recording observations
- **Learning assessment:** Record keeping, Written test

## Formative assessment

Assessment	Weightage in Marks
End of semester examination	25
Practical Internal Assessment	25
<b>Total</b>	<b>50</b>

## Practical end semester examination pattern

Q.No	Question pattern	Mark
1	Identify, classify and comment on the given spotters with neat labelled diagram (A, B and C)	3 X 4 = 12
2	Identify/classify and comment on the given slides with neat labelled diagram (D and E)	2 X 4 = 8
3	Type study	05
	<b>Total</b>	<b>25</b>

**SEMESTER - II**  
**SUMMARY OF CREDITS**

<b>DEPARTMENT OF ZOOLOGY (Undergraduate)</b> <b>(2024 onwards )</b>								
<b><u>Semester</u></b> <b><u>II</u></b>	<b>Code Number</b>	<b>Title</b>	<b>No. of hours of instructions</b>	<b>Number of hours of teaching per week</b>	<b>Number of credits</b>	<b>Continuous Assessment (CA) Marks</b>	<b>End semester marks</b>	<b>Total marks</b>
Theory	ZO 224	<b>CHORDATE ZOOLOGY</b>	45	03	03	40	60	100
Practical	ZO 2P124	<b>CHORDATE ZOOLOGY – PRACTICAL</b>	30	03	02	25	25	50

<b>CORE COURSES (CC)</b>	
<b>Course Title</b>	<b>Code Number</b>
Chordate Zoology	ZO 224
Chordate Zoology – Practical	ZO 2P124

## COURSE CONTENT

Semester	II
Paper Code	ZO 224
Paper Title	CHORDATE ZOOLOGY
Number of teaching hours per week	3
Total number of teaching hours per semester	45
Number of credits	3

### OBJECTIVE

To provide students with an in-depth knowledge of the diversity and biology of chordate forms and enable students to identify and classify them in their respective groups.

### COURSE OUTCOME

At the end of the course, the student should be able to:

- Learn the origin of chordates
- Learn the general characters of chordates
- Understand the chordate evolutionary tree
- Identify unique and peculiar features of each class of chordates
- Compare and contrast the evolution of anatomical structures in different groups of chordates

<b>CHORDATE ZOOLOGY</b>	<b>45 HOURS</b>
<b>Unit I: HEMICHORDATA AND RECENT TRENDS IN CHORDATE SYSTEMATICS</b>	<b>3 HRS</b>
<ul style="list-style-type: none"> <li>Hemichordates: Features, classification with examples, and systematic position</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>Prominent Zoologists and Institutes in India associated with Chordate systematics.</li> </ul>	1 hr
<b>Unit II: GENERAL FEATURES OF CHORDATES</b>	<b>7 HRS</b>
<ul style="list-style-type: none"> <li>Salient features of Chordates and recent trends in classification Chordate origins: A brief account of Barrington's Combined theory</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>Cephalochordata: Salient features of Cephalochordates, Amphioxus- External morphology, Feeding and digestion</li> </ul>	3 hr
<ul style="list-style-type: none"> <li>Urochordata: Salient features of Urochordates</li> <li><u>Ascidian tadpole and retrogressive metamorphosis (Self-study)</u></li> </ul>	2 hr
<b>Unit III: AGNATHA</b>	<b>3 HRS</b>
<ul style="list-style-type: none"> <li><u>Salient features of Agnatha, Classification up to classes (Self-study)</u></li> </ul>	1 hr
<ul style="list-style-type: none"> <li>Ammocoete larva- structure and its phylogenetic significance</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>Organisation and evolutionary significance of Ostracoderms</li> </ul>	1 hr
<b>Unit IV: PISCES</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>General characters – with emphasis on the primary aquatic adaptations. Outline classification.</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>Differences between cartilaginous &amp; bony fishes</li> </ul>	
<ul style="list-style-type: none"> <li>Organisation and evolutionary significance of Placoderms</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>Type study: Circulatory and Respiratory systems of shark</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>Features and Evolutionary significance of Dipnoi</li> </ul>	1 hr
<b>Unit V: AMPHIBIA</b>	<b>7 HRS</b>
<ul style="list-style-type: none"> <li>General characters, Classification up to orders</li> <li><u>Origin of amphibia and adaptation to life on land (Self-study)</u></li> </ul>	2 hr
<ul style="list-style-type: none"> <li>Type study: A brief account of the digestive, respiratory, circulatory, and urogenital systems of Frog</li> </ul>	4 hr
<ul style="list-style-type: none"> <li>Metamorphosis: Neuro-endocrine control of metamorphosis in Amphibia, Pedogenesis and Neoteny</li> </ul>	1 hr
<b>Unit VI: REPTILIA</b>	<b>5 HRS</b>
<ul style="list-style-type: none"> <li>General characters with special reference to terrestrial adaptations</li> <li>Classification with examples</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>A brief account on fossae in reptiles, Living fossil – Sphenodon</li> </ul>	2 hr
<ul style="list-style-type: none"> <li><u>Mesozoic radiation – Dinosaurs, Pterosaurs, Ichthyosaurs, and Mammal-like reptiles (Self-study)</u></li> </ul>	1 hr

<ul style="list-style-type: none"> <li>• General adaptations in snakes including poison apparatus, venom types</li> </ul>	1 hr
<b>Unit VII: AVES</b>	<b>4 HRS</b>
<ul style="list-style-type: none"> <li>• General characteristics and classification of Aves</li> <li>• Differences between Ratitae and Carinatae</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Origin of flight, Adaptations for aerial mode of life - anatomical and physiological, mechanism of Gas exchange, Aerodynamics of flight</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• <u>Evolution of endothermy and its significance (Self-study)</u></li> </ul>	1 hr
<b>Unit VIII: MAMMALS</b>	<b>7 HRS</b>
<ul style="list-style-type: none"> <li>• General characteristics of Mammals, Classification with examples</li> </ul>	1 hr
<ul style="list-style-type: none"> <li>• Salient features of Prototheria, Metatheria, Insectivora, Carnivora, Chiroptera, Perissodactyla, Artiodactyla, Cetacea and Proboscidea</li> </ul>	3 hr
<ul style="list-style-type: none"> <li>• Origin and evolutionary trends in mammalian diversification with reference to adaptive radiation of limb structure</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• <u>Salient features and outline classification of primates with examples (Self-study)</u></li> </ul>	1 hr
<b>Unit IX: CHORDATE INTEGUMENT AND SENSORY ORGANS</b>	<b>4 HRS</b>
<ul style="list-style-type: none"> <li>• Integument and its derivatives in vertebrates (epidermal glands, epidermal scales and scutes, horns, hair, claws, nails and hoof)</li> </ul>	2 hr
<ul style="list-style-type: none"> <li>• Organs in vertebrates: Olfactory, gustatory, photoreceptors, and statoacoustic organs (lateral line system; electroreception in fishes; echolocation in Bats)</li> </ul>	2 hr

**NOTE: 06 hours of self-study assigned from the above units.**

**REFERENCES:**

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## Pedagogy

- **Teaching methods:** Lecture/ Presentation/ videos/ models.
- **Learning activities:** Presentation/ group discussion/ Seminar
- **Learning assessment:** Assignment/ Term Papers/ Test

## Formative assessment

Assessment	Weightage in Marks
House Examination/Test – Mid semester test	20
Written Assignment/Presentation/Project /Seminar – I-CA-1	10
Written Assignment/Presentation/Project /Seminar – II-CA-II	10
<b>Total</b>	<b>40</b>

## End semester question paper pattern

Questions	With choices	Total mark
1 mark	10 x 1	10
5 marks	4 x 5 (6 questions)	20
10 marks	3 x 10 (5 questions)	30
<b>Total</b>		<b>60</b>



### Course content - Practical

Semester	II
Paper Code	ZO 2P124
Paper Title	CHORDATE ZOOLOGY PRACTICAL
Number of teaching hours per week	3
Total number of teaching hours per semester	30
Number of credits	2

#### OBJECTIVE

To impart practical knowledge on systematics, morphology, and anatomy of chordates and train students in basic laboratory skills including mounting, dissection, and identification of animal diversity.

#### COURSE OUTCOME

At the end of the course, the student should be able to:

- Identify representative animals from each class of chordates
- Collect and preserve chordate animals
- Identify and differentiate various types of scales of fishes
- Understand the importance of feet and beak modifications in birds

Unit	Practical course content
I	<b>MUSEOLOGY</b> <ul style="list-style-type: none"> <li>• Collection and preservation of chordates (Videos)</li> <li>• Hemichordates: Balanoglossus, T.S of Proboscis</li> </ul>
II	<b>LOWER CHORDATES</b> <ul style="list-style-type: none"> <li>• Urochordata- Ascidia, Ascidian tadpole</li> <li>• Cephalochordates- Amphioxus</li> <li>• Agnatha- Petromyzon, Myxine and Ammocoetes larva</li> </ul>
III	<b>FISHES-I</b> <ul style="list-style-type: none"> <li>• Hammer-headed shark, Electric Ray, Saw fish, Sucker fish, Globe fish, Eel- Muraena, Hippocampus, Flat fish</li> <li>• Accessory respiratory organs in Anabas, Clarias and Saccobranchus</li> <li>• Demonstration of buoyancy in fishes (Model method)</li> </ul>
IV	<b>FISHES- II</b> <ul style="list-style-type: none"> <li>• Mounting of gill apparatus of commercially available fishes</li> <li>• Study of types of tail fins in fishes: Homocercal (Carps), Heterocercal</li> </ul>

	(Shark) & Diphyrceral (Lungfish)
<b>V</b>	<b>FISHES- III</b> <ul style="list-style-type: none"> <li>• Mounting and microscopic examination of fish scale types</li> </ul>
<b>VI</b>	<b>AMPHIBIANS</b> <ul style="list-style-type: none"> <li>• Necturus, Ichthyophis, Axolotl, Salamander, Ambystoma, Duttaphrynus, Hyla</li> <li>• Frog endoskeleton: Vertebrae, limb bones, girdles</li> </ul>
<b>VII</b>	<b>REPTILES</b> <ul style="list-style-type: none"> <li>• Draco, Phrynosoma, Varanus, Carapace and plastron</li> <li>• Venomous and non-venomous snakes- Viper, Cobra, Krait, Sea snake, rat snake</li> </ul>
<b>VIII</b>	<b>AVES</b> <ul style="list-style-type: none"> <li>• Beak and feet modifications of parrot, duck, eagle, and crow, Identification of different types of feathers (Flight feathers, Contour feathers, Down feathers, and Filoplume)</li> <li>• Bird endoskeleton - Vertebrae, limb bones, girdles</li> </ul>
<b>IX</b>	<b>MAMMALS- I</b> <ul style="list-style-type: none"> <li>• Anteater, Loris, Mongoose, and Bat</li> <li>• Virtual dissection of Rat (Video)</li> </ul>
<b>X</b>	<b>MAMMALS- II</b> <ul style="list-style-type: none"> <li>• Study of Taxidermic methods (Using specimens available in the museum and videos)</li> <li>• Study of epidermal derivatives: Horns, Hooves, Nails, Skin glands, and hair</li> </ul>

**REFERENCES:**

1. Lal, S. S. (2009). Practical Zoology Vertebrate. Rastogi publications.

## Pedagogy

- **Teaching methods:** Lecture/ Presentation/ videos/ Virtual labs
- **Learning activities:** Identification, Individual or group Field oriented Project/ visit to a research institute.
- **Learning assessment:** Record keeping, Project report, Written test

## Formative assessment

Assessment	Weightage in Marks
End Semester Examination	25
Practical Internal Assessment	25
<b>Total</b>	<b>50</b>

## Practical end semester examination pattern

Q. No	Question pattern	Mark
1	Identify, classify and comment with a diagram on the specimen (A, B and C)	3 X 4 = 12
2	Comment on D and E (Taxidermy method / Endoskeleton/ question on virtual dissection)	2 X 2 = 4
3	Mount the given material and report the morphological features (fish scale/gill apparatus)	4
4	Field report	5
	<b>Total</b>	<b>25</b>