



KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA

Syllabus for B.Sc. Optional Zoology

(Semester Scheme) with effect from

2024-25 and onwards

I and II semester syllabus Approved in ZOOLOGY BoS

(UG) dated 10 -06-2024



**KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY,
VIJAYAPURA**

New syllabus of B.Sc.Zoology Optional Subject, I, II, III, IV, V and VI semesters, w.e.f. 2024-25 and onwards

Subject Code	Subject Title	Teaching Scheme Hrs/week		Examination			
		Theory	Practical	Exam. Duration (Hrs)	Marks		
					Theory/ Practical	IA	Total
B.Sc. I Semester (w.e.f. 2024-25 and onwards)							
BSZOOM-T01	Biology of non-Chordata	4	--	3	80	20	100
BSZOOM-P01:	Biology of non-Chordata Practicals	--	4	3	40	10	050
B.Sc. II Semester (w.e.f. 2024-25 and onwards)							
BSZOOM-T02	Biology of Chordata and Comparative Anatomy of Chordates	4	--	3	80	20	100
BSZOOM-P02	Biology of Chordata and Comparative Anatomy of Chordates	--	4	3	40	10	050
B.Sc. III Semester (w.e.f. 2025-26 and onwards)							
BSZOOM-T03	Applied Zoology, Bioinstrumentation & Techniques in Biology	4	--	3	80	20	100
BSZOOM-P03	Applied Zoology, Bioinstrumentation & Techniques in Biology Practical	--	4	3	40	10	050
B.Sc IV Semester (w.e.f. 2025-26 and onwards)							
BSZOOM-T04	Biochemistry and Physiology	4	--	3	80	20	100
BSZOOM-P04	Biochemistry and Physiology Practicals	--	4	3	40	10	050
B.Sc. V Semester (w.e.f. 2026-27 and onwards)							
BSZOOMT-05.1	Genetics ,Molecular biology and Biotechnology	4	--	3	80	20	100
BSDSCZOOP-05.1	Genetics ,Molecular biology and Biotechnology Practicals	--	4	3	40	10	050
BSZOOM-T05.2	Animal Behavior, Evolution and Paleontology	4	--	3	80	20	100
BSDZOOM-P05.2	Animal Behavior, Evolution and Paleontology Practicals	--	4	3	40	10	050
BSc VI Semester (w.e.f. 2026-27and onwards)							
BSZOOM-T06.1	Cytology and Developmental Biology	4	--	3	80	20	100
BSZOOM-P06.1	Cytology and Developmental Biology Practicals	--	4	3	40	10	050
BSZOOM-T06.2	Ecology, Zoogeography And WildLife management and Conservation	4	--	3	80	20	100
BSZOOMP06.2	Ecology, Zoogeography And WildLife management and Conservation	--	4	3	40	10	050

B.Sc. Semester – I

Course Title: Biology of Non-Chordata (Theory)

Course Code: BSZOOMT01

ProgramName	B.Sc. ZOOLOGY	Semester	I
CourseTitle	Biology of Non-Chordata (Theory)		
CourseCode:	BSZOOMT01	No. of Credits	04
Contact hours	4 Hrs / Wk	Duration of SEA/Exam	3 Hrs
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes (COs): At the end of the course students will be able to:

CO1: Group the animals on the basis of their morphological characteristics.

CO2. Demonstrate comprehensive identification Abilities of non Chordate diversity

CO3: Explain structural and functional diversity of Non Chordates

CO4: Develop understanding on the diversity of life with regard to protists, non-chordates and chordates. CO

5. Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos 1-15)

Course Outcomes(COs)/ Program Outcomes(POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	x														
2			x												
3						x									
4								x							
5										x					

Units	Course Title: Biology of Non-Chordata–Theory (Code: BSZOO T01)	No. of Hrs 56
Unit -1	<p>Phylum Protozoa: General characters and classification up to classes; Type study: <i>Entamoeba histolytica</i> (Morphology, locomotion and Reproduction) Paramecium (Morphology, locomotion and Reproduction)</p> <p>Phylum Porifera: General characters and classification upto classes; Canal System in Poriferans. Type study: Sycon (Morphology and Reproduction)</p> <p>Phylum Cnidaria: General characters and classification upto classes; Type study: Hydra (Morphology and Reproduction)</p>	14
Unit -2	<p>Phylum Platyhelminthes: General characters and classification upto classes; Parasitic adaptations (morphological and physiological). Type study: Taenia (Tape worm)- (Morphology and Reproduction)</p> <p>Phylum Nematelminthes: General characters and classification upto classes; Transmission, pathogenicity and preventive measures of Ascariasis. Type study: Ascaris (Round worm)- (Morphology and Reproduction)</p>	14
Unit- III	<p>Phylum Annelida General characters and classification upto classes; Metamerism in Annelida. Type study: Hirudinaria (Leech) - (Morphology and Reproduction)</p> <p>Phylum Arthropoda General characters and classification upto classes. Type study: Palaemon (Prawn) - (Morphology, Appendages, Nervous system and Reproduction).</p>	14
Unit - IV	<p>Phylum Mollusca General characters and classification upto classes; Type study: Pila (morphology, shell, respiration, nervous system and Reproduction)</p> <p>Phylum Echinodermata General characters and classification upto classes; Water-vascular system in Asteroidea. Type study: Pentacerous (Morphology and Reproduction)</p>	14

Formative Assessment for Theory	
Assessment Occasion/type	Marks
Session test (Two tests Each for 20 marks)	10
Seminar/Group discussion	5
Assignment/Field work/Minor project	5
Total	20

Semester –I

Course Title: Biology of Non-Chordata (Practical)

Course Code: BSZOOM P1

Program Name	B.Sc. ZOOLOGY	Semester	I
Course Title	Biology of Non-Chordata (Practicals)		
Course Code:	BSZOOMP01	No. of Credits	02
Contact hours	4 Hrs / Wk	Duration of SEA/Exam	3 Hrs
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):At the end of the course, students will be able to:

CO 1: Understand basics of classification of non-chordates.

CO 2: Learn diversity of Habit and Habitat of the species

CO 3: Develop the skills to identify different classes and species of animals.

CO 4: Know uniqueness and importance of a particular animal of non-chordates.

CO 5: Enhancement of basic laboratory skill like keen observation and drawing.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos 1-15)

Course Outcomes(COs)/ Program Outcomes(POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1				X											
2					X										
3									X						
4													X		
5											X				

Expt. No.	Course Title: Non-Chordata –Practical (Code: BSZOOMP01)	56.hrs / sem
1	Preparation and observation of protozoan culture. Protozoa: Systematics of <i>Amoeba</i> , <i>Euglena</i> , <i>Noctiluca</i> , <i>Paramecium</i> and <i>Vorticella</i> (Permanent slides/ Charts).	4
2	Porifera: Systematics of <i>Sycon</i> , <i>Euplectella</i> , <i>Hyalonema</i> , <i>Spongilla</i> and <i>Euspongia</i> T.S of <i>Sycon</i> , Spicules and Gemmules (Specimens/ Permanent slides/ Charts)	4
3	Cnidaria: Systematics of <i>Aurelia</i> and <i>Metridium</i> (Specimens). Slides/Charts of <i>Hydra</i> , <i>Obelia</i> - polyp and medusa, and <i>Ephyra</i> larva, T.S. of <i>Metridium</i> passing through mesenteries. Study of Corals- <i>Astraea</i> , <i>Fungia</i> , <i>Meandrina</i> , <i>Corallium</i> , <i>Gorgonia</i> , <i>Millepora</i> and <i>Pennatula</i> .	4
4	Helminthes: Systematics of <i>Planaria</i> , <i>Fasciola hepatica</i> and <i>Taenia solium</i> , Ascaris- Male and female (Specimens/Charts). Slides/Charts of T.S. of <i>Planaria</i> , T.S. of male and female Ascaris.	4
5	Annelida: Systematics of <i>Nereis</i> , <i>Heteronereis</i> , <i>Sabella</i> , <i>Aphrodite</i> (Specimens/Charts). Slide/Chart of T.S. of earthworm through typhlosole.	4
6	Arthropoda: Systematics of <i>Panaeus</i> , <i>Palaemon</i> , <i>Astracus</i> , Scorpion, Spider, <i>Limulus</i> , <i>Peripatus</i> , <i>Millipede</i> , <i>Centipede</i> , Praying mantis, Termite Queen, Moth, Butterfly, Dung beetle /Rhinoscerous beetle (Any six specimens). Slide/Chart of Larvae- Nauplius, Zoea, Mysis.	8
7	Mollusca: Systematics of <i>Chiton</i> , <i>Mytilus</i> , <i>Aplysia</i> , <i>Pila</i> , <i>Octopus</i> , <i>Sepia</i> (Specimens) and Glochidium larva (Slide/Chart). Shell Pattern- <i>Unio</i> , <i>Ostrea</i> , <i>Cypria</i> , <i>Murex</i> , <i>Nautilus</i> , <i>Patella</i> , <i>Dentalium</i> ,	6
8	Echinodermata: Systematics of Sea star, Brittle star, Sea Urchin, Sea Cucumber, Sea lilly (Specimens/Charts). Slides/Charts of Bipinnaria larva, Echinopluteus larva and Pedicellaria.	6
11	Dissection of cultured specimens: Earthworm –Digestive and Nervous system or Leech-Digestive system and Nervous system Mountings : Earthworm Setae, Ovary, Pharyngeal glands , Spermathecae Leech- Jaws, Nephridia ,	8
12	Dissection of cultured specimens: Prawn- Digestive and Nervous system. or	8

Cockroach- Digestive and Nervous system. Mountings : Prawn- Appendages / Mountings : Cockroach: Mouthparts , Malpighian tubules , Spiracle	
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Formative Assessment for Practical	
Assessment Occasion/type	Marks
Session Test (Conduct test for 18 marks)	06
Practical record	02
Assignment	02
Total	Marks 10

Scheme of Practical Examination: 40 Marks for Semester end Examination

Perform all the experiments as per the instructions in each question

Semester end Examination for Practical Assessment	Distribution of Marks
1. Dissect and Display of Digestive / Nervous system of --	10
2. Mounting	04
3. Identifications (1-8) (For Each Spotting time 5 min)	16
4. Viva	5
5. Journal	5
Total	40 Marks

References:

1. Barnes, R.S.K.; Calow,P.; Olive,P.J.W.; Golding,D.W.; Spicer, J.I.(2002) The Invertebrates: Synthesis, Blackwell Publishing.
2. Hickman,C.; Roberts,L.S.; Keen,S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
3. Holland, P.(2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
4. Kardong, K.V.(2006) Vertebrates: Comparative Anatomy, Function, Evolution (4thedition), McGraw-Hill.
5. Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
6. Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia
7. Bushbaum, R.(1964)Animals without Back bones.University of Chicago Press, Publishing Home.
8. Verma, P.S. (2010). A Manual of Practical Zoology Invertebrates, S. Chand Publication, New Delhi
9. Kotpal, R.L. (2020). Modern textbook of Zoology Invertebrates, 12th Edition, Rastogi Publication, India
- 10.Jordan and Verma(2015) Invertebrate zoology S. Chand Publication, New Delhi
- 11.S.S. Lal.(2019) Practical Zoology Invertebrates , 12th Edition, Rastogi Publication, India

B.Sc. II Semester

Course Title: Biology of Chordata and Comparative Anatomy of Chordates (Theory)

Course Code: BSZOOMT2

ProgramName	B.Sc. ZOOLOGY	Semester	I
Course Title	Biology of Chordata and Comparative Anatomy of Chordates (Theory)		
Course Code:	BSZOOMT02	No. of Credits	04
Contact hours	4 Hrs / Wk	Duration of SEA / Exam	3 Hrs
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes (COs):

At the end of the course, students will be able to:

CO1: Demonstrate comprehensive identification abilities of chordate diversity

CO2: Able to explain Structural and functional diversity of Chordates

CO3: Understand evolutionary relationship amongst all chordates

CO4: To take up research in biological Sciences

CO5: Know the comparative anatomy of various systems, adaptations, physiological mechanisms of vertebrates.

CO6: Understand arrangement of endoskeleton of vertebrates.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos 1-15)

Course Outcomes(COs)/ Program Outcomes(POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	x														
2			x												
3				x											
4								x							
5										x					

Course Code BSZOOT02	Course Title: Biology of Chordata and Comparative Anatomy of Chordates (Theory)	56 Hrs
Unit -1	<p><u>Chapter I – Chordata.</u> Origin of Chordata, Basic Characters of Chordata and classification upto classes. General Characters of Hemichordata, Type study of Balanoglossus – Morphology and tornaria larva and its affinities.</p> <p><u>Chapter II:</u> General Characters of Urochordata, Type study of Herdmania – Morphology, Ascidian tadpole structure and retrogressive metamorphosis. General Characters of Cephalochordata_ Type study of Branchiostoma. (Amphioxus) Morphology, Feeding mechanism and Circulatory system. General Characters of Agntha and Classification upto classes, salient feature of Cyclostomata.</p>	14
Unit -2	<p><u>Chapter III: - Vertebrata</u> General Characters and classification of class pisces upto orders. General Characters of Chondrichthyes and Osteichthyes., Types of caudal fins and scales. General Characters and classification of class Amphibia upto orders. Origin of Amphibians, neotony and Paedogenesis.</p> <p><u>Chapter IV:</u> General Characters and classification of class Reptilia upto orders. Poison apparatus and biting mechanism in snakes. Poisonous and non non Poisonous snakes of India and Identification</p>	14
Unit- III	<p><u>Chapter V:</u> General Characters and Classification of Class Aves upto orders. Flight adaption in Birds,</p> <p><u>Chapter VI:</u> General Characters and Classification of Class Mammalia upto orders with examples. Interesting features of mammalian orders (Insectivora, Carnivora, Chiroptera, Cetacea & Primates with examples).</p>	14
Unit -IV	<p>Comparative Anatomy of Vertebrates. <u>Chapter VII:</u> Integumentary System:- Structure of skin and its derivatives. Respiratory system. Comparative account of Respiratory System in vertebrates – Pisces (Scoliodon), Amphibian (Frog) Reptiles (Lizard), Aves (Pigeon) & Mammals (Rabbit).</p> <p><u>Chapter VIII:</u> Circulatory System – Comparative account of heart and Aortic Arches in Vertebrates – Pisces (Scoliodon) Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and mammals (Rabbit). Excretory System:- Succession of Kidney in vertebrates. Nervous System: Comparative account of brain in vertebrates – Pisces (Scoliodon), Amphibian (Frog) Reptiles (Lizard), Aves (Pigeon) & Mammals (Rabbit).</p>	14

Formative Assessment for Theory	
Assessment Occasion/type	Marks
Session test (Two tests Each for 20 marks)	10
Seminar/Group discussion	5
Assignment/Field work/Minor project	5
Total	20

B.Sc. Semester – II

Course Title: Biology of Chordata and Comparative Anatomy of Chordates **(Practical)**

Course Code: BSZOOM P2

ProgramName	B.Sc. ZOOLOGY	Semester	I
Course Title	Biology of Chordata and Comparative Anatomy of Chordates (Theory)		
Course Code:	BSZOOM P02	No. of Credits	04
Contact hours	4 Hrs / Wk	Duration of SEA / Exam	3 Hrs
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Understand the external morphology of proto-chordates and chordates

CO 2: Study the cartilaginous, bony and ornamental fishes

CO 3: Understand the systematic position and classification of Chordates

CO 4: Study the comparative anatomy and internal systems of vertebrates

CO 5: Understand snakes of India, the beak and foot modifications in birds.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (Pos 1-15)

Course Outcomes(COs)/ Program Outcomes(POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	x														
2			x												
3					x										
4								x							
5										x					

Course Code: BSZOO P2	Course Title: Biology of Chordata(Practical) Course Code BSZOO P2	No of Hrs
1.	Protochordata: Balanoglossus and its T. S through proboscis, Ascidian/Herdmania and Amphioxus, T.S. of Amphioxus through pharynx and intestine Cyclostomata: -Petromyzon, Ammocoete larva and Myxine.	4
2.	Pisces: Cartilaginous Fishes – Narcine, Trygon, Pristis, Myxobolus Bony Fishes –Zebra fish, Hippocampus, Muraena, Ostracion, Tetradon, Pleuronectus, Diodon, Echeneis. (Any six). Ornamental fishes: Siamese, Koi, Oscar, Betta Sp., Neon tetra, Guppies, Gold fish, Angle fish, Rainbow fish, Mollies (Any four).	8
3.	Amphibia:-Rana, Bufo, Ambystoma, Axolotl larva, Necturus and Ichthyophis.	4
4.	Reptilia: -Turtle, Tortoise, Mabuya, Calotes, Chameleon, Varanus. Snakes-Dryophis, Rat snake, Cobra, Krait, Russell’s viper and Hydrophis	6
5.	Aves: Duck, Crow, Sparrow, Parrot, King fisher, Eagle, Woodpecker, Jacana , Horn bill Beak and feet modifications in the following examples:	6
6.	Mammalia: Rabbit, Rat, Mongoose , Bat,	4
7.	Dissections using cultured specimens or Virtually Digital software: Shark/Bony fish: Digestive system, Cranial nervous system, Circulatory system, Mounting of Scales and Brain	8

8.	Dissections using Cultured specimens or Virtually Digital software: Rat: Dissection– Digestive, Circulatory system (arterial and venous), urinogenital systems. (only demonstration)	8
9.	Skeletal System: Skull, vertebrae, girdles and limb bones (Except hands and feet) of Frog, bird, Rat or Rabbit	8

Formative Assessment for Practical	
Assessment Occasion/type	Marks
Session Test (Conduct test for 18 marks)	06
Practical record	02
Assignment	02
Total	Marks 10

Scheme of Practical Examination: 40 Marks for Semester end Examination

Perform all the experiments as per the instructions in each question

Semester end Examination for Practical Assessment	Distribution of Marks
1. Dissect and Display of Digestive / Nervous system / Circulatory system of fish	10
2. Mounting/ Labeling of Digestive, Circulatory system (arterial and venous), urinogenital systems of Rat	04
3. Identifications (1-8) (For Each Spotting time 5 min)	16
4. Viva	5
5. Journal	5
Total	40 Marks

- References:
1. Colbert et al: Colbert's Evolution of the Vertebrates: A history of the back boned animals through time. (5th ed 2002, Wiley-Liss).
 2. Hildebrand: Analysis of Vertebrate Structure (4th ed 1995, John Wiley)
 3. Kenneth V. Kardong (20015) Vertebrates : Comparative Anatomy, Function, Evolution Mc Graw Hill
 4. Mc Farland et al.,: Vertebrate Life (1979, Macmillan publishing)
 5. Parker and Haswell: Text Book of Zoology, Vol. II (1978, ELBS)
 6. Romer and Parsons: The Vertebrate Body (6th ed 1986, CBS Publishing, Japan)
 7. Young: The Life of Vertebrates (3rd ed 2006, ELBS/Oxford)
 8. Weichert C.K. and William Presch (1970). Elements of Chordate Anatomy, Tata Mc Graw Hills
 7. Verma, P.S. (2010). Manual of Practical Zoology vertebrates, S. Chand Publication, New Delhi
 8. Kotpal, R.L. (2020). Modern textbook of Zoology vertebrates, 12th Edition, Rastogi Publication, India
 9. Jordan and Verma (2013) Vertebrate zoology S. Chand Publication, New Delhi
 10. S.S. Lal. (2010) Practical Zoology Vertebrates, 12th Edition, Rastogi Publication, India

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Theory Model Question Paper for B.Sc. I and II Semester Zoology
Course Code : BSZOOT01 and BSZOOT02

Time: 3 hours

Max. Marks: 80

Instructions:

1. Answer all the questions.
2. Draw neat labeled diagrams wherever necessary

PART I. VERY SHORT ANSWER TYPE. ANSWER ANY TEN OF THE FOLLOWING

(10 X 2 = 20 Marks)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

PART- II ANSWER ANY FOUR THE FOLLOWING. SHORT ANSWER TYPE (4 X 5 = 20 MARKS)

- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

PART- III. ANSWER ANY FOUR OF THE FOLLOWING, ESSAY TYPE (4 X10=40 MARKS)

- 19.
- 20.
- 21.
- 22.
- 23.
- 24.