PSGR
Krishnammal College for Women

College of Excellence, nirf 2023-4th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with 'A++' grade by NAAC, An ISO 9001: 2015 Certified Institution
Peelamedu, Coimbatore-641004

DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES-BASED CURRICULAR FRAMEWORK (LOCF)
(I Semester)

(For the students admitted during the academic year 2024-27 Batch and onwards)

BACHELOR OF ZOOLOGY
2024 – 2027 BATCH

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PROGRAMME LEARNING OUTCOMES (PLOs)

After completion of the programme, the student will be able to:

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will:

PSO1: Gain the knowledge of Zoology through theory and practical

PSO2: Analyze the relationships among animals with their ecosystems

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment - Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, Departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations

PSGR Krishnammal College for Women

DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
BACHELOR OF ZOOLOGY – 2024-2027 BATCH
(I Semester)

(For the students admitted during the academic year 2024-27 Batch & onwards)

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2301/ HIN2301/ FRE2301	Language I – T / H / F	Lang	6	88	2	3	25	75	100	3
	II	ENG2301	English Paper I	English	6	88	2	3	25	75	100	3
	III	AS23C01	Invertebrata	CC	6	88	2	3	25	75	100	5
	III	AS24CP1	Zoology Practical I	CC	3	45	-	-	-	-	-	-
	III	CE24A01	Chemistry for Biologists I	GE	4	58	2	3	20*	55*	75	4
	III	CE23AP1	Chemistry Practical for Biologists	GE	3	45	-	-	-	-	-	-
		Non Tamil Students										
	IV	NME23B1/ NME23A1	Basic Tamil I/ Advanced Tamil I	AEC	2	28	2	-	100	-	100	**2**
		Students with Tamil as Language										
	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-
I-V	VI	COM15SER	Community Service 30 hours	GC	-	-	-	-	-	-	-	-

L – Language **E - English**
CC – Core Courses **CA – Continuous Assessment**
GE – Generic Elective **ESE–End Semester Examination**
AEC – Ability Enhancement Course
ACC – Additional Credit Course
***CA conducted for 25 converted to 20, ESE conducted for 100 converted to 55**

QUESTION PAPER PATTERN

Examination System

One test for continuous assessment will be conducted on pre-determined dates i.e., commencing on the 50th day from the date of reopening. The Model exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the courses will be as follows:

2023-2024 BATCH & ONWARDS

CA Question Paper Pattern and distribution of marks UG
Language and English
Section A 5 × 1 (No choice) : 5 Marks
Section B 4 × 5 (4 out of 6) : 20 Marks (250 words)
Section C 2 × 10 (2 out of 3): 20 Marks (500 words)
Total : 45 Marks

Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks (No choice) : 2 × 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) : 5 × 3 =15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) : 8 × 3 =24
Total : 45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English
Section A 10 × 1 (10 out of 12) : 10 Marks
Section B 5 × 5 (5 out of 7) : 25 Marks (250 words)
Section A 4 × 10 (4 out of 6) : 40 Marks (600 - 700 words)
Total : 75 Marks

Core and Allied courses:
ESE Question Paper Pattern: 5 × 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 × 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 =40

Continuous Internal Assessment Pattern
Theory
I Year UG (23 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)
Model Exam : 7 marks(Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

Practical
Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

ESE Practical Pattern
The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV
Introduction to Entrepreneurship
Quiz : 50 marks
Assignment : 25 marks
Project / Case study : 25 marks
Total : 100 Marks

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE – AS23CO1					
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
COURSE – AS24CP1					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
AS23CO1	INVERTEBRATA	Theory	88	2	-	5

Preamble

To understand the basic classification, structure and functional details of invertebrates and to appreciate the diversity of life on earth with respect to invertebrates.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the distinguished characteristics, the biodiversity, habitat, adaptation, organization and taxonomic status of invertebrates K1	K1
CLO2	Understand the importance of multicellularity significant to anatomical and physiological up gradation of the invertebrates	K2
CLO3	Identify the evolution of organ systems and differences in functional morphology of higher invertebrates	K3
CLO4	Analyze the advancement in systemic organization of invertebrates and connecting link to Chordates. Infer the application of Recent emerging technologies in learning and research in Zoology	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

INVERTEBRATA – AS23CO1 (88 Hrs)

Unit 1 (20 hrs)

Phylum Protozoa

General characteristics and Classification up to classes.

Type Study: *Paramecium caudatum* – External features, Nutrition, Locomotion - effective stroke, recovery stroke, Metachronal rhythm, Reproduction – Asexual - Binary fission, Sexual reproduction Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy.

General Essays

- Locomotion and Reproduction in Protista
- ***Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica***
- Evolution of symmetry and segmentation of Metazoa

Phylum Porifera

General characteristics and Classification up to classes.

Type Study: *Leucosolenia botryoides* **-** External features, Body wall, Spicules, Canal System, Nutrition, Reproduction.

General Essays:

- Canal System in sponges
- ***Economic importance of sponges**

Unit 2 (20 hrs)

Phylum Coelenterata

General characteristics and Classification up to classes.

Type Study: ***Obelia geniculata* -** External features, Histology of the colony, Cnidoblast and its functions, Life History of Obelia, Metagenesis.

General Essays

- ***Corals, coral reefs and coral bleaching**
- ***Polymorphism in Coelentrates**

Phylum Helminthes

General characteristics and Classification up to classes.

Type Study: *Taenia solium* - External features, Body wall, Feeding, Respiratory system, Excretory System-flame cells, Nervous system, Reproductive system, Life cycle - Onchosphere and Cysticercus larvae. Life cycle and pathogenicity of *Taenia solium.*

General Essays

1. ***Life cycle and pathogenicity of:**
    - **a) *Wuchereria bancrofti***
    - **b) *Drancunculus medinensis***
    - **c) *Ancylostoma duodenale***
2. ***Parasitic adaptations in Helminthes**

Unit 3 **(19 hrs)**

Phylum Annelida

General characteristics and Classification up to classes.

Type Study: *Megascolex mauritii* - External features, Body wall, Coelom, Locomotion, Digestive system, Respiratory system, Excretory system - Meganephridia, Micronephridia, Pharyngeal nephridia, Nervous system, Reproductive system.

General Essays

- Metamerism in annelids
- ***A Brief Account on Vermiculture**

Phylum Arthropoda

General characteristics and Classification up to classes.

Type study: *Periplaneta americana* - External features, Body wall, Mouthparts, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs, excretory system, Reproductive system.

General Essays

- Peripatus- Affinities as a living fossil.
- Metamorphosis in Insects
- ***A Brief Account on Apiculture**

Unit 4 **(19 hrs)**

Phylum Mollusca

General characteristics and Classification up to classes.

Type Study: *Pila globosa* - External features, Shell, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs - Eyes, Osphradium, Statocyst, Tentacles, Excretory system, Reproductive system.

General Essays

- Torsion in Mollusca
- ***A Brief Account on Pearl Culture**

Phylum Echinodermata

General characteristics and Classification up to classes.

Type Study: *Asterias rubens* - External features, Pedicellaria - Structure and Function, Digestive system, Respiratory system, Water vascular system - Structure and Function, Circulatory system - Perihaemal and Haemal system, Nervous system, Sense organs, Excretory system, Reproductive system.

General Essays

- ***Larval forms of Echinoderms and their evolutionary significance**
- ***Economic importance in Echinoderms**
- Affinities with Chordates

Unit 5 **(10 hrs)**

Introduction to technologies in Industrial 4.0, Applications –Automated taxonomic Identification of invertebrates, Confocal Image processing of invertebrates for identification and classification, Bio mimicry/biomimetics of invertebrates – Ant colony optimization algorithms, Beekeeping using Machine learning, Detection and identification of Stored – Grain insects using Deep learning, IOT based smart monitoring for sericulture, ***Virtual e-museum.**

***Blended Mode**

Text Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Jordan E.L and Verma P.S	Invertebrate Zoology	S. Chand and Co	2022, 1 edition
2	Nair N. C.	A Text Book of Invertebrates	Saras Publications	2015, 5 edition
3	Kaliraj, P. and Devi, T.	Artificial Intelligence Theory, models and Applications	CRC Press, Taylor & Francis Group	2022
4	Kaliraj, P. and Devi, T.	Innovating with Augmented Reality : Applications in Education and Industry	CRC Press, Taylor & Francis Group	2022
5	Kaliraj, P. and Devi, T.	Big Data Applications in Industry 4.0	CRC Press, Taylor & Francis Group	2022

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Barrington E J W	Invertebrate Structures and Function	English Language Book Society	1979, 1 edition
2.	Ekambaranatha Ayyar, M. & Ananthakrishnan, T.N.	Manual of Zoology Vol-I (Invertebrata) Part I & II	Vishwanathan (P) Ltd. Chennai	1995, 1 edition
3.	Mandal Eatik Baran	Biology of Non chordates	PHI Learning Private Limited	2018, 2 edition
4.	Kotpal R.L., Agarwal S.K and Ketarpal R.P.R	Modern Text Book of Zoology Invertebrates	Rastogi Publications	2011, 3 edition
5.	Robert	Invertebrate Zoology	W. B. Saunders International	1974, 1 edition
6.	Pechenik Jan A	Biology of the Invertebrates	McGraw-Hill International	2016, 7 edition

Related Online Contents

1. Introduction to Industry 4.0 and Industrial Internet of Things by Prof. Sudip Mishra, IIT Kharagpur.
2. A Complete Guide to Industry 4.0-Udemy
3. Introduction to Industry 4.0

Reference

1. https://academic.oup.com/sysbio/article/68/6/876/5368535
2. https://besjournals.onlinelibrary.wiley.com/doi/10.1111/2041-210X.13428
3. https://www.mdpi.com/2313-7673/4/3/62/htm
4. https://www.bio-mar.com/biological-materials-biomimetics
5. https://www.sciencedirect.com/science/article/abs/pii/S1568494609000672
6. https://www.hyperhyve.com/post/beekeeping-using-machine-learning
7. https://www.researchgate.net/publication/322958397_Detection_of_stored-grain_insects_using_deep_learning
8. https://www.ijrte.org/wp-content/uploads/papers/v8i2/B1801078219.pdf
9. https://www.perlego.com/book/3799692/industry-40-technologies-for-education-transformative-technologies-and-applications-pdf

COURSE CODE AS24CP1	COURSE NAME ZOOLOGY PRACTICAL I	Category	L	T	P	Credit
		Practical	-	-	90	4

Preamble

- To enable the students to expose practically
- To learn the taxonomy of invertebrates and Chordates.
- To understand the relationships between invertebrates, Chordates and their environment.
- To learn the location and appearance of internal organs in a typical insect.
- To understand the structure and functional organization of animals.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To understand the basic concepts of zoological classification and identify the invertebrates and chordates	K1
CLO2	To distinguish the diversity and relationships between major groups of invertebrates and Chordates.	K2
CLO3	To examine the morphology and anatomy of invertebrates and Chordates	K3
CLO4	To relate the diversity and culture/rearing of invertebrates and chordates and infer their economic utility.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong

CORE PRACTICAL - I AS23CPI (90 Hrs)

Dissections (**35 hrs)**

1. **Cockroach**
   - a. Digestive system (3 hrs)
   - b. Nervous system, (3 hrs)
   - c. Male & Female Reproductive systems (3 hrs)

2. **Fish**
   - a. Viscera, (3 hrs)
   - b. Digestive system, (3 hrs)
   - c. Reproductive system, (3 hrs)
   - d. Brain and Cranial nerves system (4 hrs)

3. **Earthworm**
   - a. Digestive system, (3 hrs)
   - b. Nervous system (4 hrs)
   - c. Reproductive system (3 hrs)

4. **Prawn** – Nervous system (3 hrs)

Mounting (**15 hrs)**

1. Mounting of scales of fishes (2 hrs)
2. Mounting of gill arch (2 hrs)
3. Mounting of earthworm setae (2 hrs)
4. Mounting of mouth parts of cockroach/mosquito/honey bee (3 hrs)
5. Mounting of Prawn appendages (3 hrs)
6. Whole mount of Euglena, Amoeba and Paramecium (3 hrs)

Spotters:

Classify giving reasons:-Parамecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat. **(2 hrs)**

Draw labelled sketches:-T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Pectoral girdle, Pelvic girdle, Fore limb and Hind limb. **(2 hrs)**

Relate Structure and function: - Gemmule, Entire & Scolex of tapeworm, Nereis -parapodium, Heteronereis, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise, Narcine-Electric organ. **(2 hrs)**

Write descriptive notes:- Nauplius larva, Pila, Bipinnaria larva, Balanoglossus, Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla. **(2 hrs)**

Give biological significance: - Chaetopterus, Peripatus, Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon. **(2 hrs)**

Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies/pond ecosystem **(5 hrs)**
2) Study of insect fauna in the college campus **(5 hrs)**
3) Visit to a sericulture farm/ Apiary/Museum **(5 hrs)**
4) Study of six common birds from different orders **(5 hrs)**

Culture Methods

1) Culture of unicellular organisms (Amoeba/Paramecium/Euglena)
2) Culture of multicellular organisms (Earthworm) **(10 hrs)**

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2019, 9th edition
2	Lal S. S.	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004, 8th edition
3	Lal S. S.	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Pedagogy:

Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.

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DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES- BASED CURRICULAR FRAMEWORK (LOCF)

(II Semester)

(For the students admitted during the academic year 2024-27 Batch and onwards)

BACHELOR OF ZOOLOGY
2024 – 2027 BATCH

PROGRAMME LEARNING OUTCOMES (PLOs)

After completion of the programme, the student will be able to:

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will:

PSO1: Gain the knowledge of Zoology through theory and practical

PSO2: Analyze the relationships among animals with their ecosystems

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment - Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, Departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations

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DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
BACHELOR OF ZOOLOGY – 2024-2027 BATCH
SCHEME OF EXAMINATION
SEMESTER II

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
II	I	TAM2302/ HIN2302/ FRE2302	Tamil Paper II/ Hindi Paper II/ French Paper II	L	6	88	2	3	25	75	100	3
	II	ENG2302	English Paper II	E	5	73	2	3	25	75	100	3
	III	AS24C02	Chordata	CC	6	88	2	3	25	75	100	5
		AS24CP1	Zoology Practical I	CC	3	45	-	3	25	75	100	5
		CE24A02	Chemistry for Biologists II	GE	5	73	2	3	20	55#	75#	4
		CE23AP1	Chemistry Practical for Biologists	GE	3	45	-	3	15	35#	50#	2
	IV	NM24UHR	Universal Human Values and Human Rights	AECC	2	30	-	-	100	-	100	2
		NM23GAW	General Awareness	AEC	SS	-	-	-	100	-	100	Gr.
		*NME23B2/ *NME23A2	Basic Tamil II/ Advanced Tamil II	AEC	SS	-	-	-	100	-	100	Gr.
I-V	VI	COM15SER	Community Service 30 Hours	GC	-	-	-	-	-	-	-	-
		24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-	-

* After class hours
# CA conducted for 25 converted to 20, ESE conducted for 75 converted to 55

L – Language
E - English
CC – Core Courses
CA – Continuous Assessment
GE – Generic Elective
ESE–End Semester Examination
AEC – Ability Enhancement Course
SS – Self study
ACC – Additional Credit Course

QUESTION PAPER PATTERN

Examination System

One test for continuous assessment will be conducted on pre-determined dates i.e., commencing on the 50th day from the date of reopening. The Model exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the courses will be as follows:

2023-2024 BATCH & ONWARDS

CA Question Paper Pattern and distribution of marks UG
Language and English
Section A 5 × 1 (No choice) : 5 Marks
Section B 4 × 5 (4 out of 6) : 20 Marks (250 words)
Section C 2 × 10 (2 out of 3): 20 Marks (500 words)
Total : 45 Marks

Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks (No choice) : 2 × 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) : 5 × 3 =15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) : 8 × 3 =24
Total : 45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English
Section A 10 × 1 (10 out of 12) : 10 Marks
Section B 5 × 5 (5 out of 7) : 25 Marks (250 words)
Section A 4 × 10 (4 out of 6) : 40 Marks (600 - 700 words)
Total : 75 Marks

Core and Allied courses:
ESE Question Paper Pattern: 5 × 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 × 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 =40

Continuous Internal Assessment Pattern
Theory
I Year UG (23 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)
Model Exam : 7 marks(Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

Practical
Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

ESE Practical Pattern
The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV
Foundation Course – Universal Human Values and Human Rights
Quiz : 50 marks
Assignment : 25 marks
Project / Case study : 25 marks
Total : 100 Marks

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**
COURSE – AS24CO2					
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
COURSE – AS24CP1					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
AS24CO2	CHORDATA	Theory	88	2	-	5

Preamble

To understand the basic classification, structure and functional details of invertebrates and to appreciate the diversity of life on earth with respect to invertebrates.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the distinguished characteristics, the biodiversity, habitat, adaptation, organization and taxonomic status of invertebrates K1	K1
CLO2	Understand the importance of multicellularity significant to anatomical and physiological up gradation of the invertebrates	K2
CLO3	Identify the evolution of organ systems and differences in functional morphology of higher invertebrates	K3
CLO4	Analyze the advancement in systemic organization of invertebrates and connecting link to Chordates. Infer the application of Recent emerging technologies in learning and research in Zoology	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

CHORDATA-AS24CO2 (88 hrs)

UNIT I: **(20 Hrs)**

Phylum Chordata Introduction, Three fundamental Chordate characters, Advancements of Chordates over other phyla. Brief classification of chordate with characters.

PROTOCHORDATA- General Characters and affinities of Urochordata and Hemichordata

Type study:Cephalochordata, Amphioxus- Affinities and Systematic Position, Habits and Habitat, External features, Body wall, Coelom, Atrium, Digestive System, Respiratory mechanism, Circulatory system, excretory system and Reproductive system.

General Essays

- *Dipnoi- lung fishes-affinities and systematic Position
- Overview of Phylogenetic analysis using Machine learning

PISCES- General Characters

General characteristics of Chondrichthyes and Osteichthyes, classification upto class

Type study: Shark - Systematic Position, Habits and Habitat, External features, Exoskeleton- Placoid Scales, Digestive System, Respiratory, Nervous system- Sense organs-Olfactory organs, Eyes, Internal ears, Neuromast or lateral line system, Ampullae of Lorenzini. Urinogenital system.

General Essays

- Migration, in fishes
- *Virtual E-museum to identify and learn different species of Pisces

UNIT II: AMPHIBIA **(17 hrs)**

General characteristics and classification upto order

Type study: Frog- Systematic Position, Habits and Habitat, External features, Sexual dimorphism, Digestive System, Respiratory system- Cutaneous respiration, Buccal respiration and Pulmonary respiration. Respiratory, Circulatory system, Nervous system, Urinogenital system

General Essays

- *Parental care in Amphibia
- Outline on Image processing for taxonomic classification

UNIT III: REPTILIA **(17 hrs)**

General characteristics and classification upto order

Type study: Calotes - Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system- Respiratory mechanism, Circulatory system, Nervous system, Sense organs, Jacobson's organs, Structure and function of Eye and Ear, Urinogenital system

General Essays

- *Poison apparatus and Biting mechanism in snakes, First aid treatment for snake bite and common poisonous and non – poisonous snakes in India
- Overview of artificial intelligence for modelling to study Reptile behavior

UNIT IV: AVES **(17 hrs)**

General characteristics and classification upto superorder

Type study: Pigeon -Systematic Position, Habits and Habitat, External features, Feathers- Structure of a typical feather in Pigeon, Types of feathers in pigeon. Muscular System- Flight muscles, Digestive System, Respiratory system- Syrinx and voice production, Air sacs and functions. Respiratory mechanism, Circulatory system, Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves, Urinogenital system.

General Essays

- *Archaeopteryx*—a connecting link
- *Flightless birds, Migration in birds

UNIT V: MAMMALIA **(17 hrs)**

General characteristics and classification upto subclass

Type study: Rabbit- Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system, Circulatory system. Nervous systemStructure and function of Eye and Ear, Excretory system, Reproductive system.

General Essays

- *Aquatic adaptations in mammals
- *GPS Tracking systems for monitoring the locomotion of wild animals.

***Blended Mode**

Text Books

S. No.	Authors	Title of the Book	Publishers	Year of Publication
1	Jordan.E.L and Verma.P.S	Chordate Zoology	S.Chand& Co	2014
2	A. Thangamani S. Prasannakumar L.M. Narayanan N. Arumugam,	A Text Book of Chordates	Saras Publications	2013

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication, Edition
1	Ekambaranatha Ayyar.M & Ananthakrishnan.T.N	A Manual of Zoology Vol.II-Part I & II	S.Vishwanathan Pvt.Ltd	2010
2	Kotpal R.L	Modern Text Book of Zoology – Vertebrates	Global Media Publications	2012
3	B Waterman, Allyn J	Chordate Structure and Function	Mac Milan & Co.,	1971
4	Young, J. Z	The Life of Vertebrates	Oxford university press	2004, 3rdEdn.

5	Pough H	Vertebrate life (e-book)	Pearson International	2018, 9thEdn.
6	Marshall and Williams Edited by Veer Baala Rastogi	Parker and Haswell Textbook of ZOOLOGY - Vertebrates -	Med tech Science Press	Volume I 2021
7	Ezra Samberg	Vertebrate Zoology	Syrawood Publishing House	2018

References

1. https://www.biorxiv.org/content/10.1101/2020.01.10.902239v4.full
2. https://www.sciencedirect.com/science/article/abs/pii/S0920548919300935 3
3. https://link.springer.com/article/10.1007/s10336-012-0908-1
4. https://wildlifeact.com/about-wildlife-act/monitoring-tracking-technology/
5. http://emuseum.psgrkcw.com/

COURSE CODE AS24CP1	COURSE TITLE ZOOLOGY PRACTICAL I	Category	L	T	P	Credit
		Practical	-	-	90	4

Preamble

- To enable the students to expose practically
- To learn the taxonomy of invertebrates and Chordates.
- To understand the relationships between invertebrates, Chordates and their environment.
- To learn the location and appearance of internal organs in a typical insect.
- To understand the structure and functional organization of animals.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To understand the basic concepts of zoological classification and identify the invertebrates and chordates	K1
CLO2	To distinguish the diversity and relationships between major groups of invertebrates and Chordates.	K2
CLO3	To examine the morphology and anatomy of invertebrates and Chordates	K3
CLO4	To relate the diversity and culture/rearing of invertebrates and chordates and infer their economic utility.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong

ZOOLOGY PRACTICAL I AS24CP1 (90 Hrs)

Dissections (**35 hrs)**

1. **Cockroach**
   - a. Digestive system **(3 hrs)**
   - b. Nervous system, **(4 hrs)**
   - c. Male & Female Reproductive systems **(3 hrs)**

2. **Fish**
   - a. Viscera, **(4 hrs)**
   - b. Digestive system, **(4 hrs)**
   - c. Reproductive system, (**4 hrs)**

3. **Earthworm**
   - a. Digestive system, **(3 hrs)**
   - b. Nervous system **(4 hrs**)
   - c. Reproductive system **(3 hrs)**

4. **Prawn** – Nervous system **(3 hrs)**

Mounting (**15 hrs)**

1. Mounting of scales of fishes **(2 hrs)**
2. Mounting of gill arch **(2 hrs)**
3. Mounting of earthworm setae **(2 hrs)**
4. Mounting of mouth parts of cockroach/mosquito/honey bee **(3 hrs)**
5. Mounting of Prawn appendages **(3 hrs)**
6. Whole mount of Euglena/Amoeba/Paramecium **(3 hrs)**

Spotters:

Classify giving reasons:-Paramecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat. **(2 hrs)**

Draw labelled sketches:-T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Pectoral girdle, Pelvic girdle, Fore limb and Hind limb. **(2 hrs)**

Relate Structure and function: - Gemmule, Tapeworm Entire & Scolex of tapeworm, Nereis -parapodium, Heteronereis, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise, Narcine-Electric organ. **(2 hrs)**

Write descriptive notes:- Nauplius larva, Pila, Bipinnaria larva, Balanoglossus, Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla. **(2 hrs)**

Give biological significance: - Chaetopterus, Peripatus, Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon. **(2 hrs)**

Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies/pond ecosystem **(5 hrs)**
2) Study of insect fauna in the college campus **(5 hrs)**
3) Visit to a sericulture farm/ Apiary/Museum **(5 hrs)**
4) Study of six common birds from different orders **(5 hrs)**

Culture Methods

1) Culture of unicellular organisms (Amoeba/Paramecium/Euglena)
2) Culture of multicellular organisms (Earthworm) **(10 hrs)**

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2019, 9th edition
2	Lal S. S.	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004, 8th edition
3	Lal S. S.	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Pedagogy:

Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.