KU1DSCZOO101: INTRODUCTION TO ZOOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC	100	KU1DSCZOO101	3+1	60

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/Tutorial	Practical	CE	ESE	Total	
3	2	25	75	100	1.5

Course Description

Introduction to Zoology, participants will delve into the definition of animals and Zoology, explore various scope of Zoology and different animal phyla, and trace the evolutionary tree that connects the myriad forms of life within this kingdom. Subsequent modules will spotlight specific groups, starting with Basal Animals like sponges, corals, and jellyfish, then progressing to the intricate world of bilaterians, including the wondrous worms of Lophotrochozoa and the fascinating insects and nematodes of Ecdysozoa. Delving further, participants will explore the evolution of deuterostomes, examining starfish, sea squirts, and amphioxus, and tracing the rise of vertebrates both in aquatic environments and their subsequent adaptation to land. The final module will captivate participants with a showcase of fascinating, enigmatic animals.

Course Pre requisite: Any student with a +2 or equivalent degree

Course Outcomes:

	Expected Outcome	**Learning Domains**
CO1	Demonstrate a deep understanding of the definition of animals, distinguishing their characteristics from other organisms.	An
CO2	Comprehend the architectural patterns and body plans of animals	U
CO3	Utilize the scientific method (hypothetico-deductive method) to test hypotheses related to biological phenomena	A
CO4	Prepare taxonomic keys using derived characteristics of organisms based on cladistic principles	An
CO5	Evaluate different strategies to collect animals and choose the right one to obtain and preserve their target species	E

*****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	1	1
CO2	3	3	1	0	0
CO3	1	2	3	2	2
CO4	3	3	3	0	0
CO5	2	2	2	0	3

COURSE CONTENTS

Module I **11 hours**

Unit I

1.1 Definition of life (General properties of living systems)

1.2. The cell theory (classical and definition by Virchow)

1.2.1 Cell Theory vs Spontaneous Generation and Pasteur's experiments.

1.3. The theory of evolution by natural selection

1.3.1 Populations: variation and inheritance; Fitness: traits, adaptation and survival

1.4. The tree of life Taxonomy, Domains of life, Hierarchical classification of organisms, scientific nomenclature of animals (brief account only).

Unit II

1.5. Principles of Science

1.5.1 Five essential characteristics of science.

1.5.2 The scientific method (hypothetico-deductive method)

1.5.2.1 Any two suitable case studies related to hypothesis testing in biology (e.g. Why do giraffes have long necks? How do ants navigate?)

1.5.2.2 Paradigm and scientific revolutions

1.5.2.3 Proximate causes and experimental sciences

1.5.2.4 Ultimate causes and evolutionary sciences.

Unit III

1.6. The geological time scale

Module II **11 hours**

Unit I

2.1 What is an animal?

2.1.1 Features shared by all animals: multicellularity, heterotrophy, locomotion and specialized cells

2.1.2 Animals as a natural group in the evolutionary tree of life

2.2 Origin of animals

2.2.1 Brief idea on why multicellularity evolved. Proposal on the division of labour by Lynn Margulis, self-cannibalism by Kerszberg and Wolpert.

2.2.2 Cambrian explosion

2.2.3 Animal phyla (A list of 33 animal phyla to be introduced).

Unit II

2.3 Architectural pattern of an animal

2.3.1 Hierarchical organization of animal complexity

2.3.1.1 Body size and evolution of animals

2.3.1.2 Surface area: Volume ratio

2.3.1.3 Mention energy requirements related to body size (e.g.: Metabolic rate in mm^3 O_2/g body mass per hour of mouse and elephant)

2.3.2 Extracellular components of metazoan bodies

2.3.3 Types of Tissues

Unit III

2.4 Animal body plans

2.4.1 Symmetry (Radiata and Bilateria)

2.4.2 Bilaterian classification based on body cavities – The Coelomata Hypothesis

2.4.3. Metamerism

2.4.4. Cephalization

Module III **12 hours**

Unit I

3.1 The Evolutionary Tree of Animals

Unit II

3.2 Protostomia (List of phyla belonging to this group to be mentioned)

3.2.1 What is a protostome?

3.2.2 Characteristics of a lophotrochozoan (Key lineages)

3.2.3 Introduction to Mollusca

3.2.4 Characteristics of an ecdysozoan (Key lineages)

3.2.5 Introduction to Arthropoda

Unit III

3.3 Deuterostomia (List of phyla belonging to this group to be mentioned)

3.3.1 Definition of deuterostomia

3.3.2 What is an echinoderm? The echinoderm body plan and key features

3.3.3 Chordata: Chordate body plan and salient features

Module IV **11 hours**

Unit I

4.1 What is a Species?

4.1.1 Typological species concept

4.1.2 Biological species concept

4.1.3 Evolutionary species concept

4.1.4 Phylogenetic species concept

4.1.5 Dynamism of species concept

4.2 Taxonomic characters and phylogeny reconstruction

4.2.1 Ancestral characters, derived characters, polarity, outgroup

4.2.3 Sources of phylogenetic information

Unit II

4.3 Theories of Taxonomy

4.3.1 Traditional evolutionary taxonomy

4.3.2 Phylogenetic systematics or cladistics

4.3.3 Mention classification of anthropoid primates and reptiles in light of evolutionary taxonomy and cladistics.

Unit III

4.4 Collection and preservation of animals

4.4.1 Collection of soil fauna, aquatic fauna

4.4.2 Quadrat method and transect methods of biodiversity survey

4.4.3 Camera traps for mammalian observation

4.4.4 Preservation of specimen - wet and dry preservation.

Module V: Practicals **30 Hours**

5.1 Preparation of taxonomic keys (of any 5 animals displayed)

5.1.1. Intended dichotomous keys

5.1.2. Bracketed dichotomous keys.

5.2 Study of microscope

5.3.1 Dissection/stereoscopic

5.3.2. Compound microscope,

5.3.2.1. Use of 10x, 45x, 100x (Any 3)

5.3.3 Camera lucida (Draw any simple biological specimen)

5.3 General features of an animal cell – demonstration.

5.4 Animal cells and tissues – four types of animal tissues viz., epithelial, connective, muscle and nervous tissue to be demonstrated

5.5 Prepare a temporary mount of cheek epithelial cells

5.6 Prepare a blood smear slide and identify different types of cells

5.7 Study of cell division – using permanent slides (mitosis and meiosis) or preparation of a temporary slide of onion root tip.

Teacher Specific Module	**9 hours**
Directions: **20 percent of the experiments can be modified by the course teacher** *Suggestion:*	

Core Compulsory Readings

1. Holland, P., (2011). The Animal Kingdom, A Very Short Introduction. Oxford University Press, New York.
2. Hickman, C. P., Roberts, L. S., Larson, A., Anson, H. I., & Eisenhour, D. J.

(2006). *Integrated principles of zoology* 12th Ed. New York: McGraw-Hill. (Chapter 1 [Module 1]; Chapter 9 [Module 2 and 3], Chapter 10 [Module 4])

3. Freeman, S., Quillin, K., & Allison, L., (2016). Biological Science. 5th Ed. Pearson Education India (Pages 1-55, Module 1; Pages 803-861 Module 2 and 3)

Core Suggested Readings (Books, Journals, E-sources Websites/ weblinks) List

1. https://www.edgeofexistence.org/species/purple-frog/
2. https://animaldiversity.org/accounts/Macaca_silenus/
3. https://www.ifoundbutterflies.org/papilio-buddha
4. https://bigcatsindia.com/royal-bengal-tiger-information-and-facts/
5. https://www.worldwildlife.org/species/indian-elephant

Assessment Rubrics:

Evaluation Type		**Marks**	
		Theory	**Practical**
• End Semester Evaluation		50	15
• Continuous Evaluation		25	10
Continuous Evaluation			
Theory/Practical	Method of Assessment	Marks	
Theory			
a)	Test paper I	5	
b)	Test paper II	5	
c)	Viva-Voce/Seminar/ Discussion	10	
d)	Assignment	5	
	Total – 25 marks		
Practical			
a)	Regularity/Punctuality	5	
b)	Laboratory skill	5	
	Total – 10 marks		