

**DEPARTMENT OF ZOOLOGY
UNIVERSITY OF ALLAHABAD**

Program: B.Sc. Zoology

Learning Outcomes Descriptors and Programme Outcomes (P.O.) for a Bachelor's degree:

Bachelor's degree: The bachelor's degree qualifies students who can apply a broad and coherent body of knowledge and skills in a range of contexts to undertake professional work and/or for further learning.

Descriptor	Knowledge and understanding: The graduates should be able to demonstrate the acquisition of:
P.O. 1.	comprehensive, factual, theoretical, and specialized knowledge in broad multidisciplinary contexts with depth in the underlying principles and theories relating to one or more fields of learning.
P.O. 2.	knowledge of the current and emerging issues and developments within the chosen field(s) of learning.
P.O. 3.	procedural knowledge required for performing and accomplishing professional tasks associated with the chosen fields of learning.
Descriptor	General, technical and professional skills required to perform and accomplish tasks: The graduates should be able to demonstrate the acquisition of:
P.O. 4.	cognitive and technical skills required for performing and accomplishing complex tasks relating to the chosen fields of learning.
P.O. 5.	cognitive and technical skills required to evaluate and analyze complex ideas,
P.O. 6.	cognitive and technical skills required to generate solutions to specific problems associated with the chosen fields of learning.
Descriptor	Application of knowledge and skills: The graduates should be able to demonstrate the ability to:
P.O. 7.	apply the acquired specialized technical or theoretical knowledge, and cognitive and practical skills to gather and analyze quantitative/qualitative data to assess the appropriateness of different approaches to solving problems,
P.O. 8.	employ the right approach to generate solutions to problems related to the chosen fields of learning.
Descriptor	Generic learning outcomes: The graduates should be able to demonstrate the ability to:
P.O. 9.	listen carefully, to read text related to the chosen fields of learning analytically and present complex information in a clear and concise manner to different groups/audiences.
P.O. 10.	communicate in writing and orally the constructs and methodologies adopted for the studies undertaken relating to the chosen fields of learning,
P.O. 11.	make coherent arguments to support the findings/results of the study

	undertaken to specialist and non-specialist audiences.
P.O. 12.	meet one's own learning needs relating to the chosen field(s) of learning,
P.O. 13.	pursue self-paced and self-directed learning to upgrade knowledge and skills that will help adapt to changing demands of the workplace and pursue higher level of education and training.
P.O. 14.	critically evaluate evidence for taking actions to generate solutions to specific problems associated with the chosen fields of learning based on empirical evidence.
P.O. 15.	make judgement and take decisions based on the analysis and evaluation of information for formulating responses to problems, including real-life problems,

Program Specific Outcomes (PSOs)

PSO1. Comprehend and Recall Biological Diversity

Students will acquire and demonstrate foundational knowledge of animal diversity, morphology, anatomy, physiology, and evolution across non-chordate and chordate phyla.

They will understand taxonomic principles, phylogenetic relationships, and the structural-functional organization of animals within ecological and evolutionary contexts.

PSO2. Apply and Analyze Zoological Principles in Life Sciences

Learners will apply zoological concepts to interpret physiological mechanisms, ecological interactions, and genetic inheritance patterns.

They will analyze complex biological systems—such as population dynamics, molecular mechanisms, and developmental processes—to understand adaptation, regulation, and behavior in animals.

PSO3. Perform and Integrate Laboratory and Field Skills

Students will acquire practical proficiency in microscopy, histological preparation, dissection, biochemical testing, physiological recording, genetic experiments, and molecular biology techniques.

They will integrate laboratory and field data, follow safety and ethical standards, and design simple experiments demonstrating independent scientific inquiry.

PSO4. Evaluate Environmental and Ethical Issues in Zoology

Graduates will assess environmental problems such as pollution, habitat degradation, and biodiversity loss, applying zoological knowledge toward sustainable solutions.

They will demonstrate ethical responsibility in animal handling, conservation efforts, and eco-friendly practices, fostering respect for all forms of life.

PSO5. Develop Research Aptitude, Communication, and Lifelong Learning Skills

Students will develop the ability to synthesize information, formulate hypotheses, and interpret data in zoological research.

They will communicate scientific ideas effectively through writing, presentation, and discussion, while cultivating a lifelong commitment to learning, innovation, and interdisciplinary collaboration.

B.Sc. PART-I
PAPER-I
A: PROTOZOA, PORIFERA, COELENTERATA

Course Outcome (CO No.)	Description
CO1	Recall and describe the general classification of non-chordate phyla up to classes, emphasizing diagnostic features and diversity among Protozoa, Porifera, and Coelenterata.
CO2	Explain the structure, life cycle, and post-embryonic development of representative types such as Euglena, Paramecium, Monocystis, and Leishmania, and relate them to human health and disease transmission.
CO3	Interpret the organization and functional aspects of Sycon, including the canal system and its adaptive significance in Porifera.
CO4	Illustrate the morphology and life cycle of Obelia and Aurelia, and analyze polymorphism in Coelenterata and coral reef formation.
CO5	Compare the structural organization and evolutionary affinities of Ctenophora with other lower metazoans, demonstrating understanding of their phylogenetic position.

Mapping of Course Outcomes (A & B)

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO 1	3	3	2	1		2	2	1	2	1	2	1		2	1
CO 2	3	3	2	1		2	2	1	2	2	2	2	1	2	1
CO 3	3	3	2	1		2	2		2	2	2	1	1	1	1
CO 4	3	2	2	1		2	2		2	1	1	1	1	1	1
CO 5	3	2	2	1		2	1		2	1	1	1		1	
CO 6	2	3	3	2	1	3	3	2	3	2	3	2	2	2	1
CO 7	2	3	3	2	1	3	2	1	3	2	3	2	2	1	1
CO 8	2	3	3	2	2	3	2	1	3	2	3	2	2	1	1
CO 9	2	3	2	2	2	3	2	1	3	2	3	2	2	2	1
CO 10	2	3	3	2	2	3	3	2	3	3	3	3	2	2	2

General classification of the non-chordate phyla upto classes. The structure, habits and post embryonic development including larval forms of the non-chordate types and special topics against each phylum mentioned below:

Protozoa - *Euglena*, *Paramecium*, *Monocystis*, *Leishmania*

Protozoa and human diseases

Porifera- *Sycon*

Canal system in Porifera

Coelenterata - *Obelia*, *Aurelia*;

General characters and affinities of Ctenophora; Polymorphism in Coelenterata; Coral reef formation

B: PHYSIOLOGY

Course Outcome (CO No.)	Description
CO6	Explain the fundamental physiological processes such as digestion, respiration, circulation, excretion, and reproduction in animals, emphasizing their regulation in humans.
CO7	Illustrate the mechanism of muscle contraction and nerve impulse transmission, correlating structure with function in neuromuscular physiology.
CO8	Describe the structure and functions of major endocrine glands and explain their hormonal roles in maintaining homeostasis.
CO9	Relate physiological processes to pathological conditions and interpret the consequences of disorders in major organ systems.
CO10	Develop practical skills in studying physiological responses such as blood circulation, muscle twitch, and gland histology through laboratory experimentation.

Physiological processes in animals with special reference to man

Physiology of Circulation

Digestion

Respiration

Excretion

Reproduction

Mechanism of muscle contraction

Nerve impulse and reflex action

Endocrine system-functions of various glands and their secretions.

PAPER II

A: PLATYHELMINTHES, ASCHELMINTHES AND ANNELIDA

Course Outcome (CO No.)	Description
CO1	Describe the general characteristics and classification of Platyhelminthes, Aschelminthes, and Annelida up to classes with examples.
CO2	Explain the morphology, life cycle, and parasitic adaptations of Schistosoma and Echinococcus, emphasizing host-parasite relationships.
CO3	Discuss the life cycle and pathogenicity of Wuchereria bancrofti and identify control measures for filariasis.
CO4	Identify plant-parasitic nematodes and assess their economic importance in agriculture.
CO5	Explain the structure, segmentation, and functional organization of Nereis and Hirudinaria, with reference to segmental and sense organs.

Mapping of Course Outcomes (A & B)

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
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CO 2	3	3	2	1		2	2		2	2	2	1	1	1	1
CO 3	3	3	2	1		2	2		2	2	2	2	1	1	1
CO 4	2	3	2	1		2	2		2	2	2	1	1	1	1
CO 5	3	3	2	2	1	2	2		3	3	3	2	2	2	1
CO 6	2	3	3	2	1	3	2		3	3	3	2	2	2	1
CO 7	2	3	3	2	1	3	3		3	3	3	3	2	2	2
CO 8	2	3	3	2	1	3	2		3	3	3	3	2	2	1
CO 9	2	3	3	2	1	3	2		3	3	3	3	2	2	1
CO 10	2	3	3	2	1	3	3	2	3	3	3	3	3	2	2

Platyhelminthes- Schistosoma, Echinococcus
Host-parasite relationship

Parasitic adaptations in Platyhelminths
 Aschelminthes And Annelida -Wuchereria bancrofti
 Plant-Parasitic nematodes
 Annelida - Neries, Hirudinaria;
 Segmental organs
 Sense Organs

B: BIOCHEMISTRY

Course Outcome (CO No.)	Description
CO6	Describe the chemical nature, structure, and classification of carbohydrates, proteins, and lipids, and explain their biological significance.
CO7	Explain the metabolic pathways such as glycolysis, Kreb's cycle, gluconeogenesis, Cori cycle, fatty acid cycle, and urea cycle.
CO8	Illustrate the nature, properties, and mechanism of enzyme action including the role of coenzymes and prosthetic groups.
CO9	Differentiate between various enzyme classes and explain the concept of induced fit theory and enzyme kinetics.
CO10	Identify and classify vitamins, discuss their sources, physiological roles, and deficiency disorders in animals.

Characteristics, classification and nature of proteins, carbohydrates and lipids
 Glycolysis, Kreb's cycle, oxidative phosphorylation, gluconeogenesis, Cori Cycle, fatty acid Cycle.
 Urea Cycle
 Enzymes-nature, properties, classification, co-enzymes, Prosthetic, group, mode of action of enzymes with special reference to induced fit theory.
 Vitamins, classification, importance and sources of vitamins.

PAPER III

A: ARTHROPODA, MOLLUSCA, ECHINODERMATA AND HEMICHORDATA

Course Outcome (CO No.)	Description
CO1	Describe the general characteristics, classification, and representative features of Arthropoda, Mollusca, Echinodermata, and Hemichordata.
CO2	Explain the morphology and functional organization of Palaemon and its economic importance.

CO3	Discuss the general characters and evolutionary affinities of <i>Peripatus</i> , highlighting its significance as a connecting link between Annelida and Arthropoda.
CO4	Explain the process and significance of insect metamorphosis and its adaptive advantages.
CO5	Illustrate the structure and physiological functions of <i>Pila</i> and <i>Unio</i> , emphasizing the processes of torsion and detorsion in Molluscs.
CO6	Describe the external features and water vascular system of <i>Asterias</i> , correlating structure with function in Echinoderms.
CO7	Explain the morphology, anatomy, and affinities of <i>Balanoglossus</i> and its position in the animal kingdom.

Mapping of Course Outcomes (A & B)

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CO 4	2	3	2	1		2	1		3	3	2	2	1	1	1
CO 5	3	3	2	1		2	1		3	3	2	2	1	1	1
CO 6	3	3	2	1		3	2		3	3	2	2	2	1	1
CO 7	3	3	2	2		2	1		3	3	2	2	1	1	1
CO 8	3	3	2	1		2	2		3	3	2	2	2	2	1
CO 9	3	3	2	1		2	2		3	3	2	2	2	2	1
CO 10	3	3	2	1		2	2		3	3	2	2	2	1	1
CO 11	2	3	3	2	1	3	2		3	3	3	2	2	1	1
CO 12	3	3	3	2	2	3	3	2	3	3	3	3	2	2	1
CO 13	3	3	3	3	2	3	3	2	3	3	3	3	3	2	2

Anthropoda: *Palaemon*

General character and affinities of *Peripatus*

Insect metamorphosis

Mollusca - *Pila*, *Unio*

Torsion and detorsion

Echinodermato -*Asterias*

Water vascular system in Echinodermata
Hemichordata - *Balanoglossus*
Afinities of Hemichordata

B: TAXONOMY AND EVOLUTION

Course Outcome (CO No.)	Description
CO8	Explain the principles, objectives, and historical development of systematics and taxonomy.
CO9	Discuss the biological species concept and theories of classification, grouping, and ranking of organisms.
CO10	Apply the principles of nomenclature using the International Code of Zoological Nomenclature (ICZN) for scientific naming of animals.
CO11	Differentiate between meristic and non-meristic characters and explain their role in taxonomic and population studies.
CO12	Describe the origin of life and explain the major concepts of the synthetic theory of evolution, including mutation, selection, migration, genetic drift, and isolation.
CO13	Analyze evolutionary phenomena such as mimicry, speciation, and adaptation, illustrating their roles in biodiversity and survival of species.

Taxonomy

Principles of systematics and taxonomy

Biological species concept

Evolutionary history of taxonomy

Taxonomic practice

Objectives of classification

Theories of classification, grouping and ranking, diversity of individuals

Principle of hierarchy, Population taxonomy.

Information retrieval

Taxonomic attributes, Kinds of variation

Opportunities and difficulties

Definition, use and application of International code of Zoological Nomenclature

Taxonomy and elementary statistics, Meristic and Non meristic data.

Evolution

Origin of life

Synthetic theory of evolution

Selection, mutation

Migration, genetic drift

Mimicry, isolation, speciation