

Course Outcomes of All Courses of B.Sc. Zoology

Course Code	Course Title	Course Outcome1	Course Outcome2	Course Outcome3	Course Outcome4	Course Outcome5
BSC I Z1	Zoology - I	Students will be able to understand the basic principles of taxonomy, including the concept of five kingdom schemes, the international code of nomenclature, cladistics, and molecular taxonomy.	Students will be able to understand the concept of protozoa and metazoa, as well as the different levels of organization within these groups.	Students will be able to classify non-chordata and chordata based on characteristics such as symmetry, coelom, segmentation, and embryogeny.	Students will be able to identify and classify specific examples of protozoa, such as Amoeba, Entamoeba, Paramecium, Euglena, Plasmodium, Trypanosoma, and Leishmania.	Students will be able to identify and classify specific examples of non-chordata, such as Leucosolenia, Sycon, Obelia, Aurelia, Beroe, Fasciola hepatica, and Taenia solium.
BSC I Z2	Zoology - II	Students will be able to describe the structure and function of the major components of a eukaryotic animal cell, including the cell membrane, cytoplasm, nucleus, and organelles.	Students will be able to explain the different mechanisms of cell membrane transport, including passive diffusion, facilitated diffusion, and active transport.	Students will be able to compare and contrast the structure and function of prokaryotic and eukaryotic cells.	Students will be able to identify the different types of cell division and explain the importance of each type for cell growth and reproduction.	Students will be able to apply their knowledge of cell biology to understand the basic principles of human physiology and disease.
BSC I Z3	Zoology - III	Students will be able to explain the historical development of the field of embryology and describe the different types and scopes of embryology.	Students will be able to compare and contrast the processes of gametogenesis in males and females, including the formation of ova, sperm, and the process of vitellogenesis.	Students will be able to describe the process of fertilization, including the activation of the ovum and the changes that occur in the organization of the egg cytoplasm.	Students will be able to explain the processes of cleavage, blastulation, and gastrulation, and how these processes establish the basic body plan of an animal.	Students will be able to describe the development of a chick embryo up to 96 hours, including the formation of extra embryonic membranes and the development of the placenta.
BSC II Z1	Zoology - I	Analyze the structure and function of various invertebrate types, including habit, habitat, morphology, organ systems, life cycle, adaptations, and	Classify invertebrates into different groups based on their distinguishing characteristics and phylogenetic relationships.	Explain the ecological roles of invertebrates and their importance in maintaining healthy ecosystems.	Evaluate the threats faced by invertebrates, such as habitat loss, pollution, and climate change, and propose potential conservation strategies.	Design and conduct scientific investigations to study the behavior, ecology, and conservation of invertebrates.

		evolutionary relationships.				
BSC II Z2	Zoology - II	Analyze how biochemical processes underpin the physiological functions of different animal systems, including digestion, respiration, circulation, excretion, reproduction, and nervous control.	Understand and explain the major metabolic pathways in animals, like glycolysis, gluconeogenesis, citric acid cycle, and oxidative phosphorylation, with a focus on energy production and utilization.	Evaluate the coordinated actions of various organ systems, such as endocrine, cardiovascular, and respiratory systems, in response to internal and external stimuli, maintaining homeostasis in diverse animal groups.	Employ acquired knowledge to analyze real-world scenarios and explain animal adaptations to different environments, including temperature, diet, and altitude.	Design and conduct basic experiments to investigate physiological or biochemical phenomena in animals, interpret data, and effectively communicate findings through written and oral presentations.
BSC II Z3	Zoology - III	Analyze the structure, function, and interconnectedness of the immune system's components, including innate and adaptive immunity, humoral and cell-mediated responses, and the role of major immune cell types.	Classify and characterize diverse microorganisms (bacteria, archaea, viruses, fungi) based on their morphology, metabolism, ecology, and pathogenic potential. Understand their interactions with the human body, both beneficial and harmful.	Gain hands-on experience with fundamental genetic engineering techniques like DNA extraction, plasmid isolation, gel electrophoresis, PCR, and basic biomolecule analysis. Interpret experimental results and draw meaningful conclusions.	Analyze the development, production, and mechanisms of action of vaccines, antibiotics, and other immunotherapeutic agents. Critically evaluate diagnostic tools used in microbiology and biotechnology.	Develop skills in scientific reasoning, data analysis, and interpreting complex biological phenomena related to immunity, microorganisms, and biotechnological applications. Propose research questions and design experiments to address them.
BSC III Z1	Zoology - I	Describe the defining features of the phylum Chordata, including the presence of a notochord, dorsal nerve cord, pharyngeal gill slits, and post-anal tail, and explain their significance in animal evolution.	Classify major chordate groups (vertebrates and cephalochordates) based on their distinctive morphological, ecological, and evolutionary characteristics. Compare and contrast the features of different chordate	Analyze the key evolutionary transitions within Chordata, including the emergence of bony fish, tetrapods, amniotes, and mammals. Explain the selective pressures and adaptations that drove these transformations.	Describe the major stages of embryonic development in representative chordates, highlighting the formation of the notochord, dorsal nerve cord, and other characteristic features. Relate developmental processes to evolutionary changes in body plans.	Understand the ecological roles of various chordate groups in diverse aquatic and terrestrial ecosystems. Apply knowledge of chordate anatomy, physiology, and behavior to analyze anthropogenic impacts on chordate populations and the broader environment.

			subgroups (e.g., fishes, amphibians, reptiles, mammals, etc.).			
BSC III Z2	Zoology - II	Analyze the interactions between organisms and their environment, including population dynamics, community ecology, energy flow, and nutrient cycling. Explain how these principles regulate the structure and function of ecosystems.	Apply evolutionary concepts to understand the diversity of life on Earth. Analyze how adaptation, natural selection, and other evolutionary forces have shaped species, traits, and ecosystems over time.	Assess the impact of human activities on the environment, including pollution, climate change, habitat loss, and resource depletion. Develop skills in environmental problem-solving and propose potential solutions.	Conduct hands-on field investigations to study ecological and evolutionary phenomena in diverse ecosystems. Analyze data, interpret results, and effectively communicate findings through scientific reports and presentations.	Cultivate a critical understanding of the interconnectedness of humans and the natural world. Develop a sense of responsibility for environmental conservation and promote sustainable practices for the future of our planet.
BSC III Z3	Zoology - III	Design and conduct field and laboratory experiments to investigate various aspects of animal biology, including behavior, morphology, physiology, and ecology. Apply your knowledge to real-world applications such as pest control, animal husbandry, and wildlife conservation.	Analyze the diverse behaviors of animals in their natural environment, focusing on communication, foraging, mating, social interactions, and environmental adaptations. Employ ethological principles to interpret animal behavior and its ecological significance.	Utilize statistical tools and software to analyze biological data collected in applied zoological and ethological studies. Understand and interpret key statistical tests, confidence intervals, and regression analyses to draw meaningful conclusions from your data.	Combine your understanding of applied zoology, ethology, and biostatistics to tackle real-world problems related to animal populations, wildlife management, and human-animal interactions. Propose evidence-based solutions and evaluate their potential impact.	Effectively communicate your findings from applied zoological and ethological studies to both scientific and non-scientific audiences. Utilize various communication strategies, including written reports, presentations, and visual aids, to convey complex information in a clear and engaging manner.

B.Sc. Zoology Program Summary Sheet

S.NO.	Program Outcomes (POs):	Program Specific Outcomes (PSOs):	Program Educational Objectives (PEOs):
PO1/PSO1/PEO1	Apply scientific knowledge and principles to solve complex problems in the field of Zoology.	Master the fundamental principles of animal taxonomy, classification, and evolutionary relationships.	Become successful professionals in fields related to Zoology, such as research, academia, government agencies, environmental conservation, animal husbandry, and biotechnology.
PO2/PSO2/PEO2	Conduct scientific investigations, analyze data, and draw valid conclusions based on evidence.	Understand the structure, function, and interactions of cells, tissues, organs, and organ systems in various animal groups.	Pursue postgraduate studies in Zoology or related disciplines to advance scientific knowledge and contribute to meaningful research.
PO3/PSO3/PEO3	Effectively communicate scientific findings through written and oral presentations, reports, and publications.	Analyze the processes of development, reproduction, and physiology in diverse animal taxa.	Apply critical thinking and problem-solving skills to address real-world challenges related to animal populations, biodiversity conservation, and human-animal interactions.
PO4/PSO4/PEO4	Demonstrate critical thinking and problem-solving skills in analyzing biological phenomena.	Apply knowledge of animal behavior, ecology, and conservation biology to address environmental challenges.	Demonstrate effective communication, collaboration, and leadership skills within the scientific community and broader society.
PO5/PSO5/PEO5	Work effectively in teams and collaborate with scientists from diverse backgrounds.	Design and conduct field and laboratory experiments to investigate various aspects of animal biology.	Maintain ethical principles and professional integrity in all aspects of their work and contribute to sustainable development.
PO6/PSO6/PEO6	Adapt to technological advancements and utilize computational tools for data analysis and research.	Utilize biostatistical tools and software to analyze biological data and draw meaningful conclusions.	Embrace lifelong learning and continuously update their knowledge and skills in the rapidly evolving field of Zoology.

Mapping of Course Outcomes of Various Courses of B.Sc. Zoology Program With Program Outcomes (Pos), Program Specific Outcomes (Posos) & Program Educational Objectives (Peos)				
Course Outcome	PO	PSO	PEO	Level
BSC I ZOOLOGY PAPER I				
Understand basic principles of taxonomy	PO 1	PSO 1	PEO 1, PEO 2, PEO 6	Remember, Medium
Understand protozoa and metazoa concepts	PO 1	PSO 2	PEO 1, PEO 2, PEO 6	Remember, Medium
Classify non-chordata and chordata	PO 1, PO 4	PSO 1, PSO 3	PEO 1, PEO 3, PEO 6	Medium, Apply
Identify and classify specific protozoa	PO 1, PO 4	PSO 1, PSO 5	PEO 1, PEO 3, PEO 6	Hard, Analyze
Identify and classify specific non-chordata	PO 1, PO 4	PSO 1, PSO 5	PEO 1, PEO 3, PEO 6	Hard, Analyze
BSC I ZOOLOGY PAPER II				
Describe structure & function of animal cell components	PO 1	PSO 2	PEO 1, PEO 2, PEO 6	Medium Understand
Explain cell membrane transport mechanisms	PO 1, PO 4	PSO 2	PEO 1, PEO 3, PEO 6	Medium Apply
Compare & contrast prokaryotic & eukaryotic cells	PO 1, PO 4	PSO 1, PSO 2	PEO 1, PEO 3, PEO 6	Medium Analyze
Identify cell division types & explain their importance	PO 1, PO 4	PSO 2, PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Apply cell biology knowledge to human physiology & disease	PO 1, PO 3, PO 8	PSO 2, PSO 4	PEO 1, PEO 3, PEO 5, PEO 6	Hard Apply
BSC I ZOOLOGY PAPER III				
Explain historical development & types of embryology	PO 1	PSO 3	PEO 1, PEO 2, PEO 6	Medium Understand
Compare & contrast gametogenesis in males & females	PO 1, PO 4	PSO 3	PEO 1, PEO 3, PEO 6	Medium Analyze
Describe fertilization & changes in egg cytoplasm	PO 1	PSO 3	PEO 1, PEO 2, PEO 6	Medium Understand
Explain cleavage, blastulation, gastrulation & body plan formation	PO 1, PO 4	PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Describe chick embryo development with extra embryonic membranes & placenta	PO 1, PO 3	PSO 3, PSO 4	PEO 1, PEO 3, PEO 6	Medium Apply

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Course Outcome	PO	PSO	PEO	Level
BSC II ZOOLOGY PAPER I				
Analyze structure & function of invertebrates	PO 1, PO 2, PO 4	PSO 1, PSO 2, PSO 3	PEO 1, PEO 2, PEO 3, PEO 6	Hard Analyze
Classify invertebrates by characteristics & phylogeny	PO 1, PO 4	PSO 1, PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Explain ecological roles of invertebrates	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6, PEO 8	Medium Analyze
Evaluate threats to invertebrates & propose conservation strategies	PO 1, PO 4, PO 8	PSO 4, PSO 5	PEO 1, PEO 3, PEO 5, PEO 6	Hard Apply
Design & conduct investigations on invertebrates	PO 1, PO 2, PO 5, PO 6	PSO 4, PSO 5	PEO 1, PEO 3, PEO 5, PEO 6	Hard Create
BSC II ZOOLOGY PAPER II				
Analyze biochemical basis of animal systems	PO 1, PO 4	PSO 2, PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Understand and explain major metabolic pathways	PO 1	PSO 2	PEO 1, PEO 2, PEO 6	Medium Understand
Evaluate coordinated responses of organ systems	PO 1, PO 4	PSO 2, PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Apply knowledge to animal adaptations	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6	Medium Apply
Design and conduct experiments, interpret data, communicate findings	PO 1, PO 2, PO 3, PO 6	PSO 2, PSO 5	PEO 1, PEO 2, PEO 3, PEO 5, PEO 6	Hard Analyze
BSC II ZOOLOGY PAPER III				
Analyze immune system components & interconnectedness	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6	Hard Analyze
Classify & characterize microorganisms	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6	Medium Analyze
Gain hands-on experience with genetic engineering techniques	PO 1, PO 2, PO 6	PSO 2, PSO 5	PEO 1, PEO 2, PEO 3, PEO 6	High Apply
Analyze vaccines, antibiotics, & diagnostic tools	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6	Hard Analyze
Develop research skills & propose experiments	PO 1, PO 2, PO 4, PO 6	PSO 2, PSO 5	PEO 1, PEO 2, PEO 3, PEO 6	Hard Create

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Course Outcome	PO	PSO	PEO	Level
BSC III ZOOLOGY PAPER I				
Describe defining features of phylum Chordata & their significance	PO 1	PSO 1, PSO 3	PEO 1, PEO 2, PEO 6	Medium Understand
Classify major chordate groups & compare/contrast subgroups	PO 1, PO 4	PSO 1, PSO 2	PEO 1, PEO 3, PEO 6	Medium Analyze
Analyze key evolutionary transitions within Chordata	PO 1, PO 4	PSO 1, PSO 3	PEO 1, PEO 3, PEO 6	Hard Analyze
Describe major stages of chordate development & relate to evolution	PO 1, PO 4	PSO 1, PSO 3	PEO 1, PEO 3, PEO 6	Medium Analyze
Understand ecological roles of chordates & apply knowledge to analyze anthropogenic impacts	PO 1, PO 3, PO 4, PO 8	PSO 2, PSO 4	PEO 1, PEO 3, PEO 5, PEO 6, PEO 8	Hard Apply
BSC III ZOOLOGY PAPER II				
Analyze interactions & principles regulating ecosystems	PO 1, PO 4	PSO 4	PEO 1, PEO 3, PEO 6	Hard Analyze
Apply evolutionary concepts to analyze biodiversity	PO 1, PO 4	PSO 1, PSO 4	PEO 1, PEO 3, PEO 6	Hard Analyze
Assess human impact & propose environmental solutions	PO 1, PO 3, PO 4, PO 8	PSO 4	PEO 1, PEO 3, PEO 5, PEO 6, PEO 8	Hard Apply
Conduct field investigations, analyze data & communicate findings	PO 1, PO 2, PO 3, PO 6	PSO 4, PSO 5	PEO 1, PEO 2, PEO 3, PEO 5, PEO 6	Hard Create
Cultivate critical understanding & promote sustainable practices	PO 3, PO 8	PSO 4	PEO 3, PEO 5, PEO 6, PEO 8	Medium Apply
BSC III ZOOLOGY PAPER III				
Design & conduct experiments, apply knowledge to real-world applications	PO 1, PO 2, PO 5, PO 6	PSO 4, PSO 5	PEO 1, PEO 2, PEO 3, PEO 5, PEO 6	Hard Create
Analyze diverse animal behaviors, apply ethological principles	PO 1, PO 4	PSO 2, PSO 4	PEO 1, PEO 3, PEO 6	Hard Analyze
Utilize statistical tools & software, interpret results	PO 1, PO 2, PO 6	PSO 4, PSO 5	PEO 1, PEO 2, PEO 3, PEO 6	Hard Apply
Combine knowledge to tackle real-world problems, propose solutions	PO 1, PO 3, PO 4, PO 8	PSO 4	PEO 1, PEO 3, PEO 5, PEO 6, PEO 8	Hard Apply
Effectively communicate findings to scientific & non-scientific audiences	PO 3, PO 5	PSO 5	PEO 1, PEO 2, PEO 3, PEO 5, PEO 6	Hard Create