

# Don Bosco College Kohima

## PROGRAMME OUTCOMES (POs), PROGRAMME SPECIFIC OUTCOMES (PSOs) AND COURSE OUTCOMES (COs)

### Department of ZOOLOGY

#### Program Outcomes (POs):

Upon completion of the course, students should have

- 1. Critical Thinking and Problem Solving:** Graduates will demonstrate the ability to analyze complex problems, think critically, and formulate effective solutions using appropriate methodologies.
- 2. Effective Communication:** Graduates will possess strong oral and written communication skills, enabling them to convey ideas clearly and persuasively in diverse professional settings.
- 3. Professional Competence:** Graduates will exhibit proficiency in their chosen field, applying theoretical knowledge and practical skills to contribute effectively to their profession.
- 4. Ethical Responsibility:** Graduates will understand and adhere to ethical principles, demonstrating integrity, honesty, and respect for diverse perspectives in their professional and personal endeavors.
- 5. Collaborative Leadership:** Graduates will demonstrate leadership qualities by effectively collaborating with others, fostering teamwork, and inspiring individuals towards common goals.
- 6. Lifelong Learning:** Graduates will commit to lifelong learning and professional development, continuously acquiring new knowledge and adapting to evolving technologies and practices in their field.

#### Programme Specific Outcomes (PSOs)

Zoo.1- Explore the vast diversity of animal life, including their classification, evolution, and adaptation to different environments.

Zoo.2- Gain insights into the ecological roles of animals, their interactions with the environment, and the importance of biodiversity conservation.

Zoo.3- Learn about the structure and function of various animal systems, including nervous, circulatory, digestive, and reproductive systems.

Zoo.4- Investigate animal behavior, including social structures, communication, mating rituals, and foraging patterns.

Zoo.5- Understand the principles of conservation biology and the threats facing animal populations, as well as strategies for their protection and management.

Zoo.6- Develop skills in research methods, data analysis, and experimental design through laboratory work and field studies.

Zoo.7- Prepare for various career paths, including wildlife conservation, environmental consultancy, research, education, and veterinary science.

Zoo.8- Cultivate critical thinking skills to analyze complex biological problems and propose effective solutions.

Zoo.9- Explore ethical issues related to animal research, conservation practices, and human-animal interactions.

Zoo.10- Recognize the interdisciplinary nature of zoology, integrating knowledge from fields such as genetics, ecology, evolution, and environmental science.

### Course outcome (COs)

Paper code and name	Course Learning Outcomes
C1: Non-Chordates I: Protists & Pseudocoelomates	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Learn about the importance of systematics, taxonomy and structural organization of animals.</li> <li>• Appreciate the diversity of non-chordates living in varied habitats and habitats.</li> <li>• Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.</li> <li>• Critically analyse the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla.</li> <li>• Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.</li> <li>• Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments and projects.</li> </ul>
C2: Principles of Ecology	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.</li> <li>• Comprehend the population characteristics, dynamics, growth models and interactions.</li> <li>• Understand the community characteristics, ecosystem development and climax theories.</li> <li>• Know about the types of ecosystems, food chains, food webs, energy models, and ecological efficiencies.</li> <li>• Apply the basic principles of ecology in wildlife conservation and management.</li> <li>• Inculcate scientific quantitative skills, evaluate experimental design, read graphs, and analyse and use information available in scientific literature.</li> </ul>

<p>C3: Non-Chordates II: Coelomates</p>	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Learn about the importance of systematics, taxonomy and structural organization of animals.</li> <li>• Appreciate the diversity of non-chordates living in diverse habitats and habitats.</li> <li>• Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.</li> <li>• Critically think about the organization, complexity and characteristic features of non-chordates.</li> <li>• Getting familiarized with the morphology and anatomy of representatives of various animal phyla.</li> <li>• Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.</li> <li>• Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments and projects.</li> </ul>
<p>C4: Cell Biology</p>	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Understand fundamental principles of cell biology.</li> <li>• Explain structure and functions of cell organelles involved in diverse cellular processes.</li> <li>• Appreciate how cells grow, divide, survive, die and regulate these important processes.</li> </ul>

	<ul style="list-style-type: none"> <li>• Comprehend the process of cell signalling and its role in cellular functions.</li> <li>• Have an insight to how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.</li> <li>• Learn the advances made in the field of cell biology and their applications.</li> </ul>
C5: Diversity of Chordates	<p>Upon completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand different classes of chordates, level of organization and evolutionary relationship between different subphyla and classes, within and outside the phylum.</li> <li>• Study about diversity in animals making students understand about their distinguishing features.</li> <li>• Appreciate similarities and differences in life functions among various groups of animals in Phylum Chordata.</li> <li>• Comprehend the circulatory, nervous and skeletal system of chordates.</li> <li>• Know about the habit and habitat of chordates in marine, freshwater and terrestrial ecosystems.</li> </ul>
C6: Physiology: Controlling and Coordinating Systems	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Know the basic fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.</li> <li>• Comprehend and analyze problem-based questions</li> <li>• Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body and use of feedback loops to control the same</li> <li>• Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body. Synthesize ideas to make connection between knowledge of physiology and real world situations, including healthy lifestyle decisions and homeostatic imbalances</li> <li>• Know the role of regulatory systems viz. endocrine and nervous systems and their amalgamation in maintaining various physiological processes.</li> </ul>
C7: Fundamentals of Biochemistry	<ul style="list-style-type: none"> <li>• Upon completion of the course, students should be able to: Gain knowledge and skill in the fundamentals of biochemical sciences, interactions and interdependence of physiological and biochemical processes.</li> <li>• Get exposed to various processes used in industries and gain skills in techniques of chromatography and spectroscopy.</li> <li>• Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.</li> <li>• Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyze the resulting data.</li> <li>• Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.</li> </ul>
C8: Comparative Anatomy of Vertebrates	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Explain comparative account of the different vertebrate systems</li> <li>• Understand the pattern of vertebrate evolution, organization and functions of various systems.</li> <li>• Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.</li> <li>• Understand the evolution of heart, modification in aortic arches, structure of respiratory organs used in aquatic, terrestrial and aerial vertebrates; and digestive system and its anatomical specializations with respect to different diets and feeding habits.</li> <li>• Learn the evolution of brain, sense organs and excretory organs to a complex,</li> </ul>

	<p>highly evolved form in mammals;</p> <ul style="list-style-type: none"> <li>• Learn to analyze and critically evaluate the structure and functions of vertebrate systems, which helps them to discern the developmental, functional and evolutionary history of vertebrate species.</li> <li>• Understand the importance of comparative vertebrate anatomy to discriminate human biology.</li> </ul>
C9: Physiology: Life Sustaining Systems	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Have a clear knowledge of basic fundamentals and understanding of advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.</li> <li>• Comprehend and analyze problem-based questions on physiological aspects.</li> <li>• Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use of feedback loops to control the same.</li> <li>• Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.</li> </ul>
C10: Biochemistry of metabolic process	<p>Upon completion of the course, students will be able to</p> <ul style="list-style-type: none"> <li>• Gain knowledge and skill in the interactions and interdependence of physiological and biomolecules</li> <li>• Understand essentials of the metabolic pathways along with their regulation.</li> <li>• Know the principles, instrumentation and applications of bioanalytical techniques.</li> <li>• Get exposure to various processes used in industries.</li> <li>• Become aware about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments and analyze the resulting data.</li> <li>• Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals</li> </ul>
C11: Molecular Biology	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Describe the basic structure and chemistry of nucleic acids, DNA and RNA;</li> <li>• Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.</li> <li>• Elucidate the molecular machinery and mechanism of information transfer processes – transcription and translation – in prokaryotes and eukaryotes;</li> <li>• Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs;</li> <li>• Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons;</li> <li>• Give an overview of gene expression regulation in eukaryotes;</li> <li>• Explain the significance of DNA repair mechanisms in controlling DNA damage;</li> <li>• Recognize role of RNAs (riboswitches, siRNA and miRNA) in gene expression regulation.</li> <li>• Demonstrate practical knowledge of raising, handling, maintenance and special features such as antibiotic resistance of a simple prokaryotic model organism, <i>Escherichia coli</i>.</li> <li>• Quantitatively estimate concentration of DNA and RNA by colorimetric methods.</li> </ul>
C12: Principles of Genetics	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics.</li> </ul>

	<ul style="list-style-type: none"> <li>• Gain knowledge of the basic principles of inheritance.</li> <li>• Analyse pedigree leading to development of analytical skills and critical thinking enabling the students to present the conclusion of their findings in a scientific manner.</li> <li>• Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day to day life.</li> <li>• Find out the effects of indiscriminate use of various chemicals, drugs or insecticides in nature by studying their effect on various bacterial species in soil and water samples from different industrial or polluted areas.</li> </ul>
C13: Developmental Biology	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.</li> <li>• Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these.</li> <li>• Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.</li> <li>• Discuss the general mechanisms involved in morphogenesis and to explain how different cells and tissues interact in a coordinated way to form various tissues and organs.</li> <li>• Understand about the evolutionary development of various animals.</li> <li>• Know the process of ageing leading to interventions that can improve the overall health and quality of life in aged people.</li> <li>• Learn the importance of latest techniques like stem cell therapy, in vitro fertilization and amniocentesis etc. to be applied for human welfare.</li> <li>• Develop the skill to raise and maintain culture of model system; <i>Drosophila</i> in the laboratory.</li> </ul>
C14: Evolutionary Biology	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Acquire problem solving and high order analytical skills by attempting numerical problems as well as performing simulation studies of various evolutionary forces in action.</li> <li>• Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.</li> <li>• Gain knowledge about the relationship of the evolution of various species and the environment they live in.</li> <li>• Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment.</li> <li>• Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.</li> <li>• Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.</li> <li>• Use various software to generate interest towards the field of bioinformatics and coding used in programming language</li> </ul>
C15: Animal Behaviour and Chronobiology	<p>Upon completion of the course, students should be able to:</p> <ul style="list-style-type: none"> <li>• Describe and classify the major types of animal behaviors, including innate and learned behaviors, and understand the evolutionary mechanisms underlying them.</li> <li>• Explain the principles of chronobiology and how various environmental cues, such as light, temperature, and social factors, influence animal circadian rhythms and biological clocks.</li> <li>• Analyze experimental methodologies used in studying animal behavior and chronobiology, including observational studies, field experiments, and laboratory techniques.</li> </ul>

	<ul style="list-style-type: none"><li>• Critically evaluate current research in animal behavior and chronobiology, including seminal studies and recent advances, and assess their significance in understanding animal ecology and evolution.</li><li>• Apply theoretical concepts and experimental findings to real-world scenarios, such as wildlife conservation, animal welfare, and human-animal interactions.</li><li>• Demonstrate effective communication skills by presenting scientific information related to animal behavior and chronobiology through oral presentations, written reports, and scientific discussions.</li><li>• Collaborate with peers in group projects and discussions to explore interdisciplinary connections between animal behavior, chronobiology, and other fields such as ecology, physiology, and neuroscience.</li></ul>
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