

PO & CO FOR B.Sc. IN ZOOLOGY (PROGRAMME)

w.e.f. 2017-2018

**DARJEELING GOVERNMENT COLLEGE,
P.G. DEPARTMENT OF ZOOLOGY,
LEBONG CART ROAD, DARJEELING – 734101**

Programme Outcomes

Program Name: B.Sc. in Zoology & General Degree Programme Course

After the completion of B.Sc. Honours and General Degree Programme, the students will be able to achieve the following outcomes:

PO1: Subject Knowledge: Students learn the principles of animal sciences and develop their understanding of the intricate relationships between different living things.

PO2: Critical thinking and Cognitive skills: The Programme fosters in students a variety of skills that are useful for the advancement of society and the country as a whole as well as for their future academic endeavors, including creativity, scientific aptitude, logical thinking, critical analysis, and problem-solving abilities.

PO3: Instrumentation and Experiments: Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments

PO4: Environment conservation and sustainability: Knowledge of the processes involved in environmental conservation, their significance, pollution prevention, biodiversity preservation, need for conservation of endangered species and need for sustainable development.

PO6: Research and Analysis: Demonstrate analytical skill and proficiency in a range of tools and techniques used in research in science and interdisciplinary programmes.

PO5: Entrepreneurship: Become knowledgeable about small-scale businesses such as aquaculture, fish farming, beekeeping, animal husbandry, and poultry farms.

PO6: Effective Communication: Effectively use the basic IT , writing and verbal skills for effective presentation and communication of ideas

PO7: Employability and higher Education: Students also have the option to enroll for higher education and B. Ed course and in different technical and job-oriented courses

PO8: Ethics : Grows to love and understand animals. Develop moral, ethical, and social principles in your personal and professional life to become a highly cultured and civilised personality.

PO11: Nation Building: Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large

Programme Specific Outcomes: PSO

After the completion of B.Sc. General Degree Programme, the student will be able to:

PSO1: Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology

PSO2: Analyse the relationships among animals with their ecosystems

PSO3: Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical science,

PSO4: Become knowledgeable about small-scale businesses such as aquaculture, fish farming, beekeeping, animal husbandry, and poultry farms.

PSO4: Understand the applications of Zoology in Agriculture, Medicine and daily life

PSO5: Gains knowledge about research methodologies, effective communication and skills of problem solving methods

PSO6: Impart awareness of the conservation of the biosphere and its sustainable use.

PSO7: Contributes the knowledge for Nation building.

Programme name: B.Sc. ZOOLOGY PROGRAMME

SEMESTER	COURSE NAME	COURSE UNIT	COURSE OUTCOME
SEM I	CC- ZOO I ANIMAL DIVERSITY	Unit 1- Protista	Upon completion of this comprehensive study encompassing animal diversity, classification, and characteristics, learners will acquire the proficiency to discern specimens based on their unique traits and accurately categorize them into their respective phyla. Furthermore, they will possess the capability to elucidate the distinctive features and mechanisms inherent in various animals, including metamerism, metamorphosis, torsion, the water vascular system, osmoregulation, and parental care. Through an in-depth exploration of parasite life cycles, learners will grasp the detrimental effects these organisms inflict upon their hosts, particularly in human contexts. Additionally, learners will develop the aptitude to discriminate between poisonous and non-poisonous snakes and comprehend the intricate biting mechanisms employed by these reptiles. This academic endeavor equips learners with a nuanced understanding of animal biology, facilitating their engagement in scientific discourse and research.
		Unit 2 - Porifera	
		Unit 3-Cnidiria	
		Unit 4 - Platyhelminthes	
		Unit 5- Nematelminthes	
		Unit 6 - Annelida	
		Unit 7 - Arthropods	
		Unit 8 - Mollusca	
		Unit 9-Echinodermata	
		Unit 10 -Protochordates	
		Unit 11-Agnatha	
		Unit 12-Pisces	
		Units 13-Amphibian	
		Unit 14-Reptiles	
		Unit 15-Aves	
		Unit 16-Mammals	
CC - ZOO I Lab	Lab 1 -Study Specimen	Laboratory work serves as a pivotal component in enabling students to adeptly identify specimens and meticulously document their defining characteristics. Through hands-on exploration and observation, students acquire the proficiency to discern subtle differences between male and female <i>Ascaris</i> specimens, as well as accurately differentiate between poisonous and non-poisonous snake species. This experiential learning approach not only hones students' observational and analytical skills but also cultivates a deeper understanding of organismal biology and taxonomy. By engaging in	
	Lab 2 - Study of permanent slide		
	Lab 3-Identification of Poisonous and non-poisonous snake		

			systematic specimen examination and classification, students develop the expertise necessary for scientific inquiry and research in the realm of biological sciences.
SEM II	CC- ZOO II COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATE	Unit 1- Integumentary System	Upon completing the course, students will acquire a comprehensive understanding of the evolutionary underpinnings and morphological distinctions among various vertebrate groups. They will demonstrate proficiency in comparing and contrasting brain anatomy across vertebrates, while also gaining insight into the intricate processes governing embryo development. Armed with this knowledge, students will be well-equipped to analyze and interpret anatomical variations and evolutionary trends within vertebrate taxa, fostering their capacity for advanced research and scholarly discourse in the field of comparative anatomy and evolutionary biology.
		Unit -2 Skeletal System	
		Unit 3- Digestive System	
		Unit 5- Circulatory System	
		Unit 6 - Urinogenital System	
		Unit 7 - Nervous System	
		Unit 8 - Sense Organs	
		Unit 9-Early Embryonic Development	
		Unit 10- late Embryonic Development	
		Unit 11 -Control of Development	
		CC ZOO II - Lab	
Lab 2 - Frog-Study of Developmental Stage.			
Lab 3 - Examination of Gamets.			
		Unit 1 - Nerve and muscle	After the completion of this course, the students will be familiar with the basic physiological mechanism of digestion, respiration, excretion, reproduction, cardiovascular system and endocrine glands. They will develop a clear understanding on neurons and muscle contraction, spermatogenesis and the menstrual cycle. They will be familiar with the metabolic
		Unit 2 - Digestion	
		Unit 3 - Respiration	
		Unit 4 - Excretion	
		Unit 5 - Cardiovascular System	

SEM III	CC ZOO III PHYSIOLOGY AND BIOCHEMISTRY	Unit 6 - Reproduction and endocrine glands	pathways of carbohydrates, lipids and proteins and the concept of enzymes and bioenergetics
		Unit 7 - Carbohydrate Metabolism	
		Unit 8 - Lipid Metabolism	
		Unit 9- Protein Metabolism	
		Unit 10 - Enzymes	
	CC ZOO III Lab	Lab 1 - Identification of histological sections of pituitary, thyroid, pancreas and adrenal gland.	This labwork provides the students with practical skills on performing various biochemical tests which can help them in their career choice. It helps them understand the physiological structure of fundamental organs like the ileum, liver, lung, kidney and mammalian endocrine glands
		Lab 2 - Identification of permanent slides of ileum , liver, lung, kidney.	
		Lab 3- Qualitative tests to identify functional groups of carbohydrates in given solution. (Glucose, Fructose, Sucrose, Lactose)	
		Lab 4 - Estimation of total protein by Lowry's method.	
		Lab 5 -Study of activity of salivary amylase under optimum conditions.	
SEM IV	CC ZOO IV GENETICS AND EVOLUTIONARY BIOLOGY	Unit 1 - Introduction to Genetics	The student will able to define evolution and understand that the evolution is a process that result im changes in genetic material over time. It reflects the adaption of organ to their changing environment. and can result in altered gene and new species. They will now understand changes in DNA caused by mutation in a coding of DNA can cause errors in protein sequence
		Unit 2 - Medelian Genetics and Extension	
		Unit 3 - Linkage, crossing over and chromosomal mapping	
		Unit 4 - Mutation	
		Unit 5 - Sex Determination	
		Unit 6 - Origin of Life	
		Unit 7 - Introduction to Evolutionary Theories	

		Unit 8 - Direct Evidences of Evolution	
		Unit 9 - Processes of Evolutionary changes	
		Unit 10 - Species concept.	
	CC ZOO IV LAB	Lab I - Study of Mendelian Inheritance & Gene Interaction using suitable examples (Chi Square Test)	The learner will now able to understand Chi square Statics. They can now identify the various disorders by human karyotype. The will be able to distinguish the homologous and analogous organs. They will know the significance of study of evolution of horse actually provides most complete record of evolution. Learners will understand how Darwin finches adapted to unstable and challenging environment that actually leads to ecological diversification and speciation.
		Lab II - Study of linkage, recombination, gene combination using the data	
		Lab III- Study of human Karyotypes from photographs	
		Lab IV - Study of fossil evidences from models and pictures	
		Lab V - Study of homology and analogy from suitable pictures	
		Lab Vi - Study of Phylogeny of horse and Darwin's finches through charts	
		Lab VII - Visit to national history museum/nature interpretation centre	
SEM V	DSE ZOO1 (Group B) APPLIED ZOOLOGY	Unit 1- Host parasite relationship	After the completion of these modules the students will have a basic idea in different aspects of applied zoology . They will have a basic knowledge of different organisms that are parasitic in nature and their mode of infection , transmission and control . They will develop a basic knowledge of economically and medically important insects and their impact on human health. They will be familiar with animal husbandry , poultry and
		Unit 2 -Epidemiology of diseases	
		Unit 3- Rickettsia	
		Unit 4 - Parasitic Protozoan	
		Unit 5- Parasitic helminths	
		Unit 6 - Insects of economic importance	
		Unit 7 - Insects of medical importance	
		Unit 8 - Animal husbandry	
		Unit 9 - Poultry farming	
		Unit 10 - Fish technology	
DSE ZOO I LAB	Lab 1 -Study of specimen	Upon completion of the lab work, students will demonstrate proficiency in the identification of various pathogenic organisms along with their respective life stages. Additionally, they will acquire the ability to recognize arthropod vectors implicated in human diseases. Furthermore,	
	lab 2- identification of arthropod vector		

		lab3- study of insect damage to crops	students will gain insight into the assessment of insect-induced damage to plant parts and stored grains, and will demonstrate competence in identifying key features and economic significance of agricultural pests. Lastly, they will compile and submit a comprehensive report on poultry farming or animal breeding centers showcasing their practical understanding of animal husbandry and management practices.
		Lab 4- Identification of economically important insects	
		Lab 5- Submission	
SEM VI	DSE- ZOO II (Group C)- INSECT, VECTORS AND DISEASES	Unit 1- Introduction to Insects	Upon completion of these modules, students will be able to discuss the general features of insects and their mouthparts in relation to feeding habits. They will differentiate between carriers and vectors, understanding the distinctions between mechanical and biological transmission, as well as the concept of reservoirs and vector adaptation. Furthermore, students will elucidate the classification of insects up to orders, highlighting the characteristic features of orders Diptera, Siphonaptera, Siphunculata, and Hemiptera. Moreover, they will comprehend the role of various insects as disease vectors and analyze the symptoms, causes, transmission, prevention, and control measures associated with vector-borne diseases. They will gain a comprehensive understanding of insect-borne disease ecology and management strategies.
		Unit 2 - Concept of Vectors	
		Unit 3- Insects as Vectors	
		Unit 4 - Dipterans as Disease Vectors	
		Unit 5 - Siphonaptera as Disease Vectors	
		Unit 6 - Siphunculata as Disease Vectors	
		Unit 7 - Hemiptera as Disease Vectors	
	DSE ZOO II-Lab	Lab 1 - Identification	Student are expected to identify different mouth part of insect and diseases transmitted by insect vectors, to submit a project report on any one of the insect vectors and disease transmitted .
		Lab 2 - Identification	
		Lab 3 - Study of vector- borne diseases	
Lab 4 - Project Submission			
SEC I	Unit 1 - Biology of Bees	Upon completion, students will name honeybee classes, understand apiculture, explain bee rearing, hive frameworks, classify bee diseases, learn control measures, enumerate apiculture products and uses, apply entrepreneurship in apiculture, and recognize beehive benefits for	
	Unit 2 - Rearing of Bees		
	Unit 3 - Diseases and Enemies		
	Unit 4 - Bee Economy		

SEM III	Paper-1 (Group A)- APICULTURE (Theory)	Unit 5- Entrepreneurship in Apiculture	cross-pollination in horticulture.
SEM VI	SEC IV Paper-2 (Group A)- SERICULTURE (Theory)	Unit 1- Introduction Unit 2 - Biology of Silk-worm Unit 3- Rearing of Silk worm Unit 4 - Pest and Diseases Unit 5- Entrepreneurship in Sericulture	The course provides students with in-depth knowledge of silkworm cultivation, covering their life cycle, cocoon spinning, rearing room maintenance, pest and disease control, and the potential for employment in the sericulture industry.