

DEPARTMENT OF ZOOLOGY

SUB: ZOOLOGY (Honours)

PROGRAMME CODE: ZOOA

PROGRAM OUTCOMES AND COURSE OUTCOMES

PROGRAM OUTCOMES

PO1: Students understand the basics of chordate & nonchordate phyla, species diversity and the relationships between them.

PO2: Understand the concept of population, community, and ecosystem.

PO3: Analyse the distribution of animals throughout phyla, as well as their relationships with each other and the environment.

PO4: Understand the internal structure of cells as well as their functions to exert control over a variety of metabolic processes.

PO5: Comprehends the intricate processes involved in chemical and biological evolution.

PO6: Correlates the different physiological processes of animals and synchronisation of various organ systems.

PO7: Understanding of wildlife conservation processes and its importance, acts, causes of depletion and protection of endangered species.

PO8: Perform laboratory procedures as per standard protocols and apply ethical principles in different areas of life zoology.

PO9: Understands about various concepts of genetics and its importance in human health.

PO10: Understand the various modern molecular and biotechnological lab techniques and its uses.

PO11: Apply the knowledge and understanding of Zoology to one's own life and work.

PO12: Learn the ethological approaches of animal society and develops empathy and love towards the animals.

PO13: Understand the concept of immunity, immunological processes, and different immunological techniques.

PO15: Gain knowledge on types and structure of different biomolecules and its metabolism.

PO16: Understand the concept of central dogma, fine structure of gene and its regulation.

COURSE OUTCOMES

After completion of this course successfully, the students will be able to

ZOOACOR01T &1P: Non-Chordates I

CO1: Understand the basics and classification of non-Chordates phyla from Protista to Pseudocoelomates.

CO2: Learn about some protist and pseudocoelomate parasites with their life history and pathogenesis.

CO3: Identify some non-chordate preserved specimens along with their significance.

CO4: Able to prepare a project report on some invertebrate organism about their life cycle, habitat, and characteristic features.

ZOOACOR02T &2P: Ecology

CO1: Understand the concept of autecology & synecology, Limiting Factors, Biosphere, role of physical factors, ecosystem, and characteristics of community.

CO2: Learn different types of population growth and their equations, Vertical stratification, Food chain, Food web, Energy flow through the ecosystem.

CO3: Distinguish between R and K selected species and understand the competitive exclusion principle of Gause's, Prey predator model and recognize edge effect and ecotone.

CO4: Analyse fecundity tables & survivorship curves, life tables and plotting of survivorship curves of from the hypothetical data.

CO5: Understand the concept of ecological pyramids, population density, species diversity of a community by sampling method and calculation of diversity index from hypothetical and field data.

ZOOACOR03T&3P: Non-Chordates II

CO1: Able to remember the salient features and classification of non-Chordates phyla from Annelida to Hemichordata.

CO2: Identify some non-chordate preserved specimens along with their significance.

CO3: Prepare a project report on some invertebrate larvae.

ZOOACOR04T&4P: Cell Biology

CO1: understand the detail structure and functions of the various cell organelles.

CO2: Distinguish various diseases related to cell structures and functions.

CO3: Identify and prepare the different stages of cell division, and able to perform staining techniques.

CO4: Understand the concept of cell cycle and its regulations, Know about carcinogen, cancer and oncogenes.

ZOOACOR05T & 5P: Chordates

CO1: To understand characteristics of chordates and their classification in taxonomy.

CO2: To identify the morphological features chordate specimen.

CO3: Concept about the harmful parasites of human.

ZOOACOR06T & 6P: Physiology: Controlling and Coordinating Systems

CO1: Characterize and differentiate different tissue structures, bones and cartilage, histology of different types of muscle and endocrine glands.

CO2: Remember and understand the different types of muscles, analyse the molecular mechanism behind muscle contraction, able to prepare different histological sections of endocrine glands.

CO3: Develop the knowledge on coordination mechanisms of different internal systems with anatomical details in practical mode.

ZOOACOR07T & 7P: Biochemistry

CO1: Recognize the foundations of biochemistry as it relates to biomolecules like proteins, lipids, carbohydrates, and nucleic acids.

CO2: Explain the kinetics of enzymes, the mechanism of oxidative phosphorylation, and redox reactions.

CO3: Able to perform the qualitative test of functional groups in carbohydrates, proteins and lipids.

CO4: Understand the principle of chromatography, electrophoresis, and quantitative test of protein.

ZOOACOR08T & 8P: Comparative Anatomy

CO1: Describe the comparative account of integument, skeletal system, heart and aortic arches, lung, stomach, kidney, brain and sense organs in different vertebrate groups.

CO2: Understand the detail of axial and appendicular skeleton of vertebrate.

CO3: Dissect the urinogenital system, brain and mounting the pituitary gland of Tilapia.

ZOOACOR09T & 9P: Physiology: Life Sustaining system

CO1: knowledge of the various human physiological systems.

CO2: Practical knowledge about blood group detection and measurement of blood pressure by sphygmomanometer.

CO3: Develop analytical knowledge on animal physiology such as adaptation, respiration, circulation, excretion, osmoregulation, thermoregulation.

ZOOACOR10T & 10P: Immunology

CO1: Understand the concept of Immunity, distinguish between antigen & Immunogen.

CO2: Explain concept of haematopoiesis, Antigen Presenting Cells, Major Histocompatibility Complex structure of different receptors, concept of immunological synapse, types of Cytokines & Chemokines.

CO3: Analyse the endo and exocytotic pathway of antigen presentation.

CO4: Knowledge about immunity behind Malaria, Visceral Leishmaniasis, Filariasis, Dengue and Tuberculosis.

CO5: Able to Prepare stained blood film and identify different blood cells.

CO6: Understand the principle and application of RIA and ELISA.

ZOOACOR11T & 11P: Molecular Biology Lab

CO1: Recall Salient features of DNA and RNA, Watson and Crick Model of DNA, Genetic code.

CO2: Understand the concept of central dogma, Regulation of Transcription in prokaryotes as well as in eukaryotes and types of DNA repair.

CO3: Demonstrate polytene Chromosome from Drosophila /Chironomid larvae, Isolation of genomic DNA, Apply techniques like PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing, cDNA technology.

CO4: Understand the process of Isolation of genomic DNA, Analyse DNA using Agarose gel electrophoresis.

ZOOACOR12T & 12P: Genetics

CO1: Able to calculate mathematical problems based on Mendelian ratios as well as will be able to analyse tests for significance assessment.

CO2: Learn gene mutation and chromosomal aberrations, human genetic diseases and their genetical analysis. Concept on autosomal and sex-linked inheritance patterns.

CO3: Develop and characterize the basic concepts on bacterial genetics, transposable genetic elements and their significance.

ZOOACOR13T & 13P: Developmental Biology

CO1: Describe the various concepts of development and growth, cell-cell interaction and cyto-differentiation.

CO2: Characterise and comprehend the pre-embryonic, embryonic, and post-embryonic mechanisms of development.

CO3: Analyse the developmental stages of specified animals; Evaluate different in vitro fertilization technologies, stem cell technologies and harmful teratogenic substances.

ZOOACOR14T &14P: Evolutionary Biology

CO1: Understand the concept of chemical evolution and origin of life.

CO2: learn fossil types, geological time scale, adaptive radiations and various evolutionary concept.

CO3: Illustrate intelligence in understanding evolutionary changes in a population genetics framework.

CO4: Knowledge about horse evolution.

ZOOADSE01T &1P: Animal Behaviour and Chronobiology

CO1: Describe various branches of animal behaviour. Understand the concept of method of studying behaviour.

CO2: Learn the concept of society and social behaviour of some type animals.

CO3: Apply innovative thinking to study the behaviour of animals in field and prepare a project report.

CO4: Analyse the concept of learning and instinct.

CO5: Develop an understanding on the importance of chronobiology in governing activity patterns of animals.

ZOOADSE02T & 2P: Entomology: Insects and their Biology

CO1: Remember as well as describe General Features of Insects, distribution, and orders of Insects.

CO2: Classify and Describe Arthropods with special reference to Insects, Identify External Features; Head – Eyes, Types of antennae, Mouth parts with reference to feeding habits, Thorax: Wings and wing types, Types of Legs adapted to diverse habitats, Abdominal appendages, and genitalia.

CO3: Demonstrate Structure and physiology of Insect body systems.

CO4: Compare as well as Estimate major insect pests of paddy and their damages, Explain the role of Insects as mechanical and biological vectors.

ZOOADSE03T&3P: Endocrinology

CO1: Define Hormones, list their types, mechanism of actions, delivery system and regulations.

CO2: Describe the role of hormones in estrous cycle in rat & menstrual cycle in human.

CO3: Dissect and identify various endocrine glands of white rat.

CO4: Prepare and characterisation of permanent slides of endocrine tissue sections through microtomy.

CO5: Evaluate multifaceted role of VP and Oxytocin, Regulation of neuroendocrine and endocrine hormones, concept on endocrine disorders.

ZO0ADSE04T & 4P: Fish and Fishery

CO1: Outline the classification of fish upto subclasses. Comprehend various aquaculture methods with their advantages & disadvantages. Define various fishing crafts & gears. Recall different fish diseases with their causative agents and control measures.

CO2: Identify various types of fish scales and different preserved specimens with their morphometric characters. Explain the function of swim bladder & gills and describe the process of respiration, osmoregulation & Bioluminescence.

CO3: Analyse the application of GIS and remote sensing in fishery.

CO4: Prepare a project report on any fish farm.

ZO0ADSE05T&5P: Parasitology

CO1: Understand the concept of animal's associations, parasitism, types of parasite and hosts.

CO2: Remember the life history, epidemiology, pathogenesis, diagnosis and treatments of important human parasites and gain awareness.

CO3: Knowledge about parasitic arthropods as vectors of several human disease.

ZO0ADSE06T&6P: Wildlife and conservation

CO1: Understanding the values of wildlife, causes of depletion of wildlife and conservation significance.

CO2: Learn Forest types in west Bengal and application of GIS and remote sensing in determine the area of forest cover.

CO3: Aware about different wildlife acts (IUCN, WPA of India, CITES etc)

CO4: Concept on man and animal conflict, protected areas, ex-situ and in-situ conservation strategies.

CO5: Identify animals' evidence through pug marks, hoof marks, scats, pellet groups, nest, antlers in field.

DEPARTMENT OF ZOOLOGY

SUB: ZOOLOGY (General)

PROGRAMME CODE: ZOOG

PROGRAM OUTCOMES AND COURSE OUTCOMES

PROGRAMME OUTCOMES

P01. Students gain knowledge on the diversity of living animals. They will study learn biological aspects of organisms starting from protozoans to mammals.

P02. The students gain knowledge on the physiological and biochemical matters of life.

P03. The students gain knowledge on the biology of insects, vectors and the diseases related to them.

P04. From this programme the students will understand the environmental factors and their interaction with human health.

COURSE OUTCOMES

ZOOGCOR01T/ZOOHGEC01T&1P: Animal Diversity

C01. Classification of Phylum Protozoa to Echinodermata.

C02. Classification of Phylum Protochordates to Mammalia.

C03. Practical knowledge about spot identification of invertebrates and vertebrates.

C04. The students will be able to distinguish between poisonous and non-poisonous snakes practically.

ZOOGCOR02T/ZOOHGEC02T&2P: Physiology and Biochemistry

C01. Students gain fundamental knowledge of animal physiology
C02. Seeks to understand the mechanisms that work to keep the animal body alive and functioning.

C03. Interactions and interdependence of physiological and biochemical processes.
C04. Students are taught the detailed concepts of digestion, respiration, excretion, the functioning of nerves and muscles, cardiovascular system, endocrine system and reproductive system.

C05. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of animals, their organs, and the cells of which they are composed.

C06. Students learn the concepts of endocrine systems and homeostasis.

ZOOGCOR03T/ ZOOHGEC03T& 3P: Insect, Vectors and Diseases

CO1. Knowledge on morphological features of insects – their body parts and modifications.

CO2: Imparts knowledge of non-beneficial insects – vectors.

CO3 Interaction of insect vectors with humans and spread of diseases.

CO4. Managements and control of vector and vector born diseases.

ZOOGCOR04T/ ZOOHGEC04T& 4P: Environment and Public Health

CO1. Knowledge about medical care, nutrition, health and major nutritional deficiency diseases.

CO2. National Health Policy, National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).

CO3. Concept of environment degradation, issues and health hazards like personal and mental hygiene, addiction etc.

CO4. General concept of communicable diseases, mechanism of pathogenesis and their control measures.

CO5. Life Style Related Non-Communicable Diseases, their causes and prevention through dietary and lifestyle modifications.

CO6. Concept of Mental Health diseases and their management.

CO7. Social health problems like smoking, alcoholism, drug dependence and their deaddiction.

Skill Enhancement Course (SEC)

ZOOSSEC01M: Aquarium fish keeping

CO1. Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue for youth.

CO2. Aquarium fish keeping, aquarium setup and accessories.

CO3. Aquarium fishes, their food and feeding.

CO4. Fish transportation and management.

CO5. Maintenance of aquarium.

ZOOSSEC02M: Vermicompost Production

CO1: Provides knowledge about the natural role of earthworms in soil fertility and the concept of vermicompost production and it's importance.

CO2: Suitable worm species and their availability– for Large scale/small scale or commercial production of vermicompost.

CO3: To learn the Operations and maintenance procedure.

CO4: The students will learn about the Harvesting of vermicompost.

CO5: Properties of vermicompost.

CO6: Benefits of vermicompost

CO7: To learn the Use of vermicompost as soil conditioner.

CO8: To learn different Applications of vermicompost

CO9. Students will visit to a vermicompost production centre, learn the entire methods and will submit a report on it.

Discipline Specific Electives (DSE)

ZOOGDSE01T: Applied Zoology

C01. To understand different types of hetero-species relationships – parasitism, symbiosis, commensalism, zoonosis, etc.

C02. Transmission, Prevention and control of diseases: Tuberculosis, Typhoid.

C03. Brief account of *Rickettsia prowazekii*, *Borrelia recurrentis* and *Treponema pallidum*.

C04. Life history and pathogenicity of *Entamoeba histolytica*, *Plasmodium vivax* and *Trypanosoma gambiense*

C05. Life history and pathogenicity of *Ancylostoma duodenale* and *Wuchereria bancrofti*

C06. Biology, Control and damage caused by *Helicoverpa armigera*, *Pyrilla perpusilla* and *Papilio demoleus*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*

C07. Medical importance and control of *Pediculus humanus corporis*, *Anopheles*, *Culex*, *Aedes*, *Xenopsylla cheopis*

C08. Preservation of semen and artificial insemination in cattle.

C09. Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs.

C10. Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed.

ZOOGDSE02T & 2P: Food, Nutrition and Health

C01. Concept of a balanced diet, nutrient needs and dietary pattern for various groups- adults, pregnant and lactating mothers, infants, school children, adolescents and elderly.

C02. To learn dietary sources and importance of carbohydrates, lipids, proteins, vitamins, minerals.

C03. Aspects of health and diseases. Major nutritional Deficiency diseases, Lifestyle related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications.

C04. Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention.

C05. Common ailments- cold, cough, and fevers, their causes and treatment. Concepts of Nutrigenomics and health informatics.

C06. Potable water- sources and methods of purification at domestic level. Food and Water borne infections: Bacterial infection, viral infection, Protozoan infection, Helminthes infection. Vector – borne diseases.

C07. Brief account of food spoilage: Causes of food spoilage and their preventive measures.

C08. To gain practical knowledge on estimation of nutrients and food adulteration along with different health related issues concerning food and nutrition.

ZOOGDSE03T & 3P: Aquatic Biology

C01. To learn aspects of aquatic biomes: Fresh water ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

C02. To understand ecological perspectives of lakes and streams.

C03. Salinity and density of Sea water, Continental shelf, Adaptations of deep-sea organisms, Coral reefs, Sea weeds.

C04. To study the causes of aquatic pollution. Management and conservation of aquatic ecosystem. Sewage treatment and water quality assessment (BOD, COD).

C05. Practical study of different ecological parameters of aquatic ecosystems.

ZOOGDSE04T&4P: Immunology

C01. Concepts on Immune systems – components and types.

C02. To study the different types of cells and organs of immune systems.

C03. Concepts on antigens.

C04. Concepts on antibodies- structure, classes and interactions with antigens.

C05. To study the structure and function of MHC; knowledge on cytokines and complement systems.

C06. Concepts on hypersensitivity, autoimmunity and immunodeficiency.

C07. Concepts on vaccines.

C08. Practical studies on cells and organs of immune system; ABO blood grouping.