Department of Zoology
IndasMahavidyalaya

Programme Outcomes (POs):

After successful completion of 6 Semesters with Zoology as major/core subject in B. Sc (Programme) a student should be able to: -	
Programme Outcomes (POs)	**Description**
PO1: Attainment of knowledge in different areas of Zoology	Students are able to learn the basic concepts, principles and processes invarious disciplines of Zoology (animal diversity,comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology,applied Zoology, immunology, apiculture, aquarium fish keeping, medical techniques and sericulture).
PO2: Growth of Professional skills in Zoology	To grow up the basics of professional skills in the area of Zoology and its applied sectors like apiculture, aquarium fish keeping, medical techniques and sericulture.
PO3: Scientific endeavor	The student will be able to distinguish different breeds of various animals and will develop basic knowledge in other related branches of animal science.
PO4: Understanding Environmental interrelationship	Students will be able to explain the complexity of life processes and their molecular, cellular and physiological basis and their interrelationships with the environment.
PO5: Environmental awareness	To develop the knowledge of biotic and abiotic components of ecosystem and nurture healthy practices of environmental awareness among students.
PO6: Design and perform experiments to test a hypothesis	To develop knowledge for shaping design and perform experiments to test a hypothesis, to understand and interpret data to reach a conclusion as well as to understand the scientific principles underlying animal health, management and welfare.
PO7: Development of essential academic skills	To help the students for development of essential academic skills like critical thinking, analytical reasoning, research skills, basic laboratory and analytical skills, use of effective methods, participating in various programmes, statistical analysis of data gained from experiments, citing & referencing work appropriately.
PO8: Development of Employment opportunity/ higher degree	To empower the students for getting an employment in their relevant discipline or to succeed in further study such as higher degrees

Semester I

Paper – Animal Diversity

Course Code – SP/ZOO/101/C-1A Course ID – 12618

Course Outcomes (COs):

CO1	Students will be able to illustrate the details of animal kingdom.
CO2	Students will be able tounderstand the basics of animal classification.
CO3	Students will be able to write the systematic position of different animals belonging to invertebrate and vertebrate phyla.
CO4	Students will be able to understand the general and identifying characteristics of animals belonging to different phyla.
CO5	Students will be able to describe the body organization of animals belonging to different phyla.
CO6	Students will be able to describe the life cycle and parasitic adaptations of certain important animals belonging to phylum Platyhelminthes and Nematoda.
CO7	Students will be able tounderstand the various physiological mechanisms of animals belonging to different phyla.

Paper – Animal Diversity Lab

Course Code – SP/ZOO/101/C-1A Course ID – 12628

Course Outcomes (COs):

CO1	Students will be able to write the systematic position of different animal specimens belonging to invertebrate and vertebrate phyla.
CO2	Students will be able to identify different animal specimens belonging to different phyla.
CO3	Students will be able to make a concept about a wide range of Invertebrate and Vertebrate fauna.
CO4	Students will be able toknow the local distribution of Invertebrate and Vertebrate fauna in their surroundings through completion of project entitled as ‘animal album’.

Semester II

Paper – Comparative anatomy and Developmental Biology of Vertebrate

Course Code – SP/ZOO/201/C-1B Course ID – 22618

Course Outcomes (COs):

CO1	Students will be able to illustratethe structure, functions and derivatives of integumentary systems in amphibian, birds and mammals.
CO2	Students will be able to understand the evolution of visceral arches.
CO3	Students will be able tocompare the anatomy of respiratory system and nervous system among different vertebrates.
CO4	Students will be able to compare the anatomy of digestive system among different mammals.
CO5	Students will be able to describe the evolution pattern of kidneys and hearts in different vertebrates.
CO6	Students will be able tounderstand the different sense organs and the classification of receptors in vertebrates.
CO7	Students will be able tounderstand the mechanisms of early embryonic development and late embryonic development in mammals.
CO8	Students will be able to create basic ideas about fundamental processes related to control of development.

Paper – Comparative anatomy and Developmental Biology of Vertebrate Lab

Course Code – SP/ZOO/201/C-1B Course ID – 22628

Course Outcomes (COs):

CO1	Students will be able tolearn about osteology, identification of limb bones and girdles of vertebrates as well as identification of their developmental stages.
CO2	Students will be able to know about Carapace and plastron of turtle.

Semester III

Paper – Physiology and Biochemistry

Course Code – SP/ZOO/301/C-1C Course ID – 32618

Course Outcomes (COs):

CO1	Students will be able todescribe basic structure of a neuron, heart, skeletal muscle and endocrine glands and their associated physiological functions.
CO2	Students will be able to understand the metabolism of carbohydrate, protein and fat.

CO3	Students will be able to describe the physiology of digestion in the alimentary canal.
CO4	Students will be able to create basic ideas about the pulmonary ventilation and transport of oxygen and carbon dioxide in blood.
CO5	Students will be able tounderstand the physiology of male and female reproduction and its hormonal control.
CO6	Students will be able to understand the mechanism of action of enzyme and its kinetics.

Paper – Physiology and Biochemistry Lab

Course Code – SP/ZOO/301/C-1C Course ID – 32628

Course Outcomes (COs):

CO1	Students will be able tolearn a number of experimental techniques like qualitative tests of glucose/sucrose, quantitative estimation of protein, as well as estimation of enzymatic activity.
CO2	Students will be able to identify histological sections of different organs or endocrine glands of mammals.

Paper – Apiculture (Economic Zoology)

Course Code – SP/ZOO/304/SEC-1 Course ID – 32610

Course Outcomes (COs):

CO1	Students will be able toillustrate the history, classification of honeybees and the social organization of bee colony.
CO2	Students will be able to understand the different bee keeping methods and equipments for the extraction of honey.
CO3	Students will be able toknow the basic concept regarding artificial bee rearing and construction of beehives – Newton and Langstroth.
CO4	Students will be able to create the primary concept about the bee diseases and enemies, their control and preventive measures.
CO5	Students will be able to gain knowledge on the products of Apiculture Industry and its uses.
CO6	Students will be able tounderstand the Bee Keeping Industry and the recent modern methods in employing artificial beehives for cross pollination in horticultural gardens.

Semester IV

Paper – Genetics and Evolutionary Biology

Course Code – SP/ZOO/401/C-1D Course ID – 42618

Course Outcomes (COs):

CO1	Students will be able to understand the principles of inheritance of Mendelian Genetics and its Extension.
CO2	Students will be able to describe the linkage, crossing over and calculate map distance between genes.
CO3	Students will be able to describe gene mutations and types of chromosomal aberrations.
CO4	Students will be able to understand the mechanisms of sex determination in Drosophila.
CO5	Students will be able tounderstand history of life and different evolutionary theories.
CO6	Students will be able toillustratethe evolution of horses, modes of speciation, types of natural selection, macro-evolution and K-T extinction.

Paper – Genetics and Evolutionary Biology Lab

Course Code – SP/ZOO/401/C-1D Course ID – 42628

Course Outcomes (COs):

CO1	Students will be able toidentify major group of fossils from models/ pictures, human Karyotypes (Normal karyotype, Down, Klinefelter's, Turner, Cri-du-Chat syndrome).
CO2	Students will be able to verifythe results of Mendelian Inheritance and gene interactions using Chi-square test.
CO3	Students will be able to calculate map distance between genes.

Paper – Aquarium Fish Keeping (Economic Zoology)

Course Code – SP/ZOO/404/SEC-2 Course ID – 42610

Course Outcomes (COs):

CO1	Students will be able to describe biology of aquarium fishes which include exotic, endemic, fresh water and marine aquarium fishes.
CO2	Students will be able to understand characters and sexual dimorphism of fresh water and marine aquarium fishes.

CO3	Students will be able to gain knowledge about the food and feeding of aquarium fishes.
CO4	Students will be able tounderstand the transportation, handling, packing and forwarding techniques of live fishes.
CO5	Students will be able tocreate basic ideas about the maintenance of aquarium.

Semester V

Paper – Applied Zoology

Course Code – SP/ZOO/501/DSE-1A **Course ID – 52618**

Course Outcomes (COs):

CO1	Students will be able tounderstand host-parasite relationship.
CO2	Students will be able to describe epidemiology of diseases like Tuberculosis and Typhoid.
CO3	Students will be able to gain knowledge about life history and pathogenicity of parasitic protozoa and helminth.
CO4	Students will be able todescribebiology, nature of damage and control measures of economically important pests.
CO5	Students will be able togain knowledge about different cattle breeds and artificial insemination technique.
CO6	Students will be able to understand management of breeding stock and broilers as well as preservation of eggs.
CO7	Students will be able to describe deep litter system and induced breeding technique.

Paper – Applied Zoology Lab

Course Code – SP/ZOO/501/DSE-1A **Course ID – 52628**

Course Outcomes (COs):

CO1	Students will be able toidentify *Plasmodium vivax*, *Entamoeba histolytica*, *Trypanosoma gambiense*, *Ancylostomaduodenale* and *Wuchereriabancrofti*.
CO2	Students will be able to identify different arthropod vectors associated with human diseases.
CO3	Students will be able to identify different economically importantstored grain pests.
CO4	Students will be able to gain hands on experience about poultry farming techniques by visiting nearby poultry farm.

Paper – Sericulture (Economic Zoology)

Course Code – SP/ZOO/504/SEC-3 **Course ID – 52610**

Course Outcomes (COs):

CO1	Students will be able toknow about different types of silkworms and mulberry and non-mulberry Sericulture.
CO2	Students will be able to describe life cycle of *Bombyxmori*, structure of silk gland and secretion of silk.
CO3	Students will be able tounderstand the selection of mulberry variety and establishment of mulberry garden, rearing house and rearing appliances.
CO4	Students will be able toknow about different disinfectants and silkworm rearing technology.
CO5	Students will be able togain knowledge on the different pests and diseases of silkworms, its control and preventive measures.
CO6	Students will be able tocreate basic ideas about prospectus of sericulture in India, sericulture industry in different states and employment status in this sector.

Semester VI

Paper – Immunology

Course Code – SP/ZOO/601/DSE-1B **Course ID – 62618**

Course Outcomes (COs):

CO1	Students will be able toknow about the different cells, organs, and molecules involved in immunology.
CO2	Students will be able to gain the knowledge about antigenicity and immunogenicity, immunogens, adjuvants and haptens, B and T-Cell epitopes.
CO3	Students will be able todescribe the different antibodies and antigen-antibody interactions.
CO4	Students will be able to describeantigen presentation pathways, complement system and cytokines.
CO5	Students will be able to gain preliminary ideas about different types of hypersensitivity, autoimmunity and immunodeficiency.
CO6	Students will be able toknow about vaccine and its types.

Paper – Immunology Lab

Course Code – SP/ZOO/601/DSE-1B **Course ID – 62628**

Course Outcomes (COs):

CO1	Students will be able toidentify lymphoid organs of human from models or photographs.
CO2	Students will be able to identify histological sections of spleen, thymus and lymph nodes through slides/ photographs.
CO3	Students will be able to prepare stained blood film and identify different types of white blood cells.
CO4	Students will be able to determine their own blood group by ABO blood group technique.

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Paper – Aquatic Biology

Course Code – SP/ZOO/601/DSE-1B **Course ID – 62618**

Course Outcomes (COs):

CO1	Students will be able to know about the aquatic biomes, freshwater ecosystem, marine ecosystem, estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.
CO2	Students will be able to gain the knowledge about lake morphometry, physio-chemical characteristics, Nutrient cycles (Nitrogen, Sulphur and Phosphorous) in Lakes.
CO3	Students will be able to describe the continental shelf, adaptations of deep-sea organisms and Sea weeds.
CO4	Students will be able to describe Aquatic pollution, Eutrophication, Sewage treatment, BOD and COD.

Paper – Aquatic Biology Lab

Course Code – SP/ZOO/601/DSE-1B **Course ID – 62628**

Course Outcomes (COs):

CO1	Students will be able toidentify zooplanktons in lake ecosystem.
CO2	Students will be able to determine pH, turbidity, dissolved Oxygen, free carbon dioxide, alkalinity in water collected from water body.

CO3	Students will be able to know the uses and significance of different instruments like Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler.
CO4	Students will be able to gain basic ideas about pond ecosystem.

Paper – Medical Techniques

Course Code – SP/ZOO/604/SEC-4 **Course ID – 62610**

Course Outcomes (COs):

CO1	Students will be able tounderstand the different diagnostics methods used for analysis of blood.
CO2	Students will be able to know the different diagnostics methods used for urine analysis.
CO3	Students will be able tounderstand the diagnostic procedures and preventive measures for Diabetes as well as hypertension.
CO4	Students will be able todescribe causes, types, diagnosis and preventive measures for Tuberculosis and Hepatitis.
CO5	Students will be able to gain basic knowledge about Liver function test and Lipid profiling.
CO6	Students will be able tocreate primary ideas about malignant cell properties and its detection as well as different medical imaging techniques.

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