

2.6.1. Zoology (Under Graduate) Program Outcomes, Program Specific Outcomes and Course Outcomes

Zoology Program Outcomes:

1. PO1 - Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms
2. PO2 – Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment
3. PO3 – Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
4. PO4 – Understands the complex evolutionary processes and behaviour of animals
5. PO5 – Correlates the physiological processes of animals and relationship of organ systems
6. PO6 – Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species
7. PO7 – Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.
8. PO8 – Understands about various concepts of genetics and its importance in human health
9. PO9 - Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties
10. PO10 – Apply the knowledge and understanding of Zoology to one’s own life and work
11. PO11 – Develops empathy and love towards the animals

Program Specific Outcomes:

1. PSO1. Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology
2. PSO2. Analyse the relationships among animals, plants and microbes
3. PSO3. Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical science, tools and techniques of Zoology, Toxicology, Entomology, Nematology Sericulture, Biochemistry, Fish biology, Animal biotechnology, Immunology and research methodology
4. PSO4. Understand the applications of biological sciences in Apiculture, Aquaculture, Agriculture and Medicine
5. PSO5. Gains knowledge about research methodologies, effective communication and skills of problem solving methods
6. PSO6. Contributes the knowledge for Nation building.

Course Outcomes:

Animal Diversity – Invertebrates

- CO1 Describe general taxonomic rules on animal classification
- CO2 Classify Protista up to phylum using examples from parasitic adaptation
- CO3 Classify Phylum Porifera to Echinodermata with taxonomic keys
- CO4 Describe Phylum Nematoda and give examples of pathogenic Nematodes

Ecology, Zoogeography and Animal Behaviour:

- CO1 Distribution of fauna in different realms interaction
- CO2 Understand Animal behaviour and response of animals to different instincts
- CO3 Interaction of biota abiota
- CO4 Various kinds of Animal adaptations

Animal Diversity – Vertebrates & Developmental Biology:

- CO1 Imparts conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment
- CO2 Classify phylum Protochordates to Mammalia
- CO3 Complex Vertebrate interactions
- CO4 Basic concepts of developmental biology

Cell Biology, Genetics and Evolution:

- CO1 Structural and functional aspects of basic unit of life i.e. cell concepts
- CO2 Mendelian and non mendelian inheritance
- CO3 Concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism
- CO4 Theories of Evolution
- CO5 Knowledge of eras and evolution of species

Physiology and Biochemistry:

- CO1 Seeks to understand the mechanisms that work to keep the human body alive and functioning
- CO2 Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of humans, their organs, and the cells of which they are composed
- CO3 Interactions and interdependence of physiological and biochemical processes

ANIMAL PHYSIOLOGY

CO1 Students are taught the detailed concepts of digestion respiration excretion the functioning of nerves and muscles

CO2 Students gain fundamental knowledge of animal physiology

CO3 Students will gain skill to execute the roles of a biology teacher or medical lab technicians with training as they have basic fundamentals

Animal physiology genetics and evolution

CO1 Students learn the concepts of endocrine systems and homeostasis a brief account of genetics and organic evolution.

CO2 This course helps students to gain fundamental knowledge in these topics

CO3 Students gain fundamental knowledge of physiology and endocrine systems

CO4 Students gain fundamental knowledge of physiology of homeostasis

CO5 Understanding of basic concepts of genetics, laws of inheritance and central dogma of biology

CO6 Understanding of genetic basis of evolution, human karyotyping and speciation

Applied Zoology

CO1 Understands concepts of fisheries, fishing tools and site selection

CO2 Aqua culture systems, induced breeding techniques, post harvesting techniques

CO3 Understands about composition of blood, blood born diseases, autopsy and biopsy

CO4 Types of immunity, antigens-antibodies and their properties

Entomology:

CO1 Imparts knowledge of beneficial and non-beneficial insects

CO2 Knowledge of how they interact with their environment, other species and humans

CO3 Classification of Insects

CO4 Role of insects in spread of diseases

Sericulture:

CO1 Gives knowledge of silk worm rearing

CO2 Mulberry cultivation

CO3 Pests and diseases associated with silk worm and mulberry

CO4 Various process involved in silk production

Immunology:

CO1 Imparts in depth knowledge of tissues, cells and molecules involved in host defense mechanisms

CO2 Understanding of types of immunity

CO3 Interactions of antigens, antibodies, complements and other immune components

CO4 Understanding of immune mechanisms in disease control, vaccination, process of immune interactions

Animal biotechnology:

CO1 Imparts the Knowledge to culture animal cells in artificial media.

CO2 Knowledge of animal cells in culture, growth of cell lines

CO3 Use in recombinant DNA technology, genetic manipulations and in a variety of industrial processes.

Aquarium fish management

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

Clinical Science and pathology:

CO1 Understands about composition of blood, blood born diseases, autopsy and biopsy

CO2 Techniques of microscopy, microtomy, biopsy, autopsy and immunological techniques

CO3 Types of immunity, antigens-antibodies and their properties

CO4 Understanding of pathology of diseases caused by various microorganisms such as bacteria, virus, parasites and fungus

Structural Biology

CO1 Allows the students to gain basic knowledge about various bio molecules and their role in metabolism

CO2 Classification of enzymes, enzyme kinetics

CO3 Metabolism of carbohydrates, nucleic acids and metabolic disorders

CO4 Gains understanding of cellular organization and functional biology nucleic acids

Environmental and Conservation Biology [ECB]

- CO1 Imparts knowledge to the student regarding environment and conservation biology.
- CO2 Gains knowledge in the areas of responses to Laws of limiting factor, Laws of minimum, Laws of Tolerance and Tragedy of commons
- CO3 Types of ecosystem – freshwater, marine and terrestrial,
- CO4 Population characteristics and dynamics – conceptual approach
- CO5 Growth curves and pyramids; sigmoid curve, J curve and hyperbola; logistic equation and concepts relating to growth
- CO6 The students will be well equipped to become very competent in research or teaching fields after completion of this course

Immunology

- CO1 Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health.
- CO2 Types of immunity, antigens-antibodies and their properties
- CO3 Complement system, MHC's and immune responses
- CO4 Understanding of types of hypersensitivity reactions and auto immune diseases
- CO5 Ability to understand concepts of tumor immunology and transplantation immunology

Taxonomy, Systematics and Functional Anatomy of Invertebrates

- CO1 Imparts knowledge regarding the various Invertebrates species and the regulatory processes to safeguard them
- CO2 With the study of this paper students gain knowledge in the areas of responses to Systematic position, general organization and affinities of Ctenophora and Nemertea
- CO3 Rhynchoceola; Systematic position, general organization and affinities of Rotifera;
- CO4 Systematic position, general organization and affinities of Hemichordata
- CO5 The students will be well equipped to become very competent in research or teaching fields after completion of this course

Animal Physiology

CO1 Imparts knowledge about various metabolic and physiological mechanisms of the human body.

CO2 Understands about neurophysiology and receptors

CO3 Gain knowledge about hormones and bioluminescence

CO2 Understanding of stress physiology and endocrine mechanisms will allow them to control their stress and emotions there by diverting their energy towards the positive nation building activities

Molecular Genetics and Developmental Biology

CO1 Knowledge about genetics, developmental biology and organogenesis

CO2 Application of DNA technology and molecular biology for research

CO3 Gains knowledge about gametogenesis, cleavage mechanisms, gastrulation and role of hormones in metamorphosis and regeneration

CO4 Provides students insight into maintaining healthy relationships with their opposite gender and allows them to make right choice about their life partner thus preventing congenital/consanguial diseases.

Evolution and Functional Anatomy of Vertebrates

CO1 Imparts knowledge regarding the various theories of evolution, evolutionary process such as variation, speciation, natural selection, origin of primates and man

CO2 Understanding of origin and salient features of Ostracoderms to Actinopterygii, adaptive radiation of Amphibians, Reptiles, birds and Mammals

CO3 Gains knowledge of functional anatomy of vertebrates from fishes to mammals

CO4 Understanding of evolutionary significance of internal fertilization, neoteny and paedogenesis

CO5 Identifies the significance of amniotic egg its structure and evolutionary significance of skeletal system

Systems Biology

CO1 Imparts knowledge regarding the various concepts of systems biology, systems approach and its application in biological systems

CO2 The structural biology paper is physiological chemistry of all the bio molecules .

CO3 The paper imparts trough knowledge in the fundamentals of biochemistry of all the biomolecules like the carbohydrates ,proteins, lipids, nucleic acids, their classification structure and metabolism.

CO4 Understanding of Mammalian biological clocks, Sustainable pest and disease management and bioremediation

CO5 Develops skills of Insect outbreak models Data formats, simulation techniques, modeling tools

CO6 Application, characterization and interactions of nanoparticles in biological systems

Research Methodology

CO1 The course provides wide knowledge about research, experimental & sampling design,

CO2 Data collection, analysis & interpretation of data and allows student to present the research data in scientific method

CO3 Gains skill to solve problems using inferential statistical tools

CO4 Learns to collect literature collection, literature citation, and components of research report – Text, tables, figures, bibliography.

CO5 Writing of dissertations, project proposals, project reports, research papers.

CO6 Intellectual Property Rights – Biopiracy, copyrights, patent and traditional knowledge and plagiarism.

CO7 Understanding of Laboratory safety measures, laboratory good practices, animal model systems, animal ethics- animal welfare guidelines for care and use of animals.

Comparative Animal Physiology

CO1 Comparative animal physiology is a comprehensive subject that gives in depth knowledge of various physiological processes in the animal kingdom

CO2 students gain knowledge about the comparative physiological concepts of nutrition digestion respiration excretion metabolism and osmoregulation.

CO3 Course provides students comprehensive understanding about neurobiology, neurophysiology, molecular neurobiology

CO4 Understanding of cognitive/behavior neurobiology, thus allowing them to correlate the human behaviour under given situation.

CO5 It gives comprehensive understanding regarding inborn disorders and deranged metabolisms.

CO6 Students feel confident in teaching physiology as well as executing research projects

Comparative animal physiology

CO1 With the study of this paper students gain knowledge in the areas of responses to environment with study of receptors CNS integration of behavior

CO2 Understanding of the functions of effectors in all aspects as well as the circulatory physiology and reproduction and adaptations by animals to environment

CO3 The students will be well equipped to become very competent in research.

CO4 The course provides employability in teaching fields

Applied Toxicology

CO1 It is a discipline overlapping with biology, chemistry, medicine that involves the study of toxicants, their mechanism of action.

CO2 It involves the study of the adverse effects of chemical substances on living organisms.

CO3 Skill development in environmental and occupational Toxicology

CO4 It provides opportunities for students research projects, internships in assessing the effects of toxic pollutants on the environment and in the food chain

Medical Entomology

CO1 Medical Entomology is an integral part of applied ecology involving the study of diverse ecto and endoparasites

CO2 Understanding of fundamental complement of numerous diseases which have significant impact on human health

CO3 Understanding of Insect vector host interactions of many important diseases like Malaria, Filariasis, Dengue etc.

CO4 Understanding of denudation of forests its results in increased human vector contact which have become almost irreversible.

CO5 Course gives insight into physiology, biochemistry and reproduction of insect vectors and their control measures.

CO6 Students gain knowledge about the concepts of overview of Entomology

CO7 Source reduction and environmental methods for vector control, biological control and other Insect bites

CO8 Knowledge of hormones and Insects

CO9 Students get good insight into how Medical Entomology is acting as a promising factor for entomologist vacancies in both public and private sectors

CO10 Student gains knowledge regarding vector born diseases their pathology, control measures, thus aiming at 'Swach and Swasth Bharat'

CO11 Students feel confident in teaching Medical Entomology as well as executing research projects

Sericulture

CO1 Gives knowledge of silk worm rearing, mulberry cultivation, pests and diseases associated with silk worm, mulberry and various process involved in silk production. CO2 It is an agro based cottage industry in India that enables them to get self-employment

CO3 Sericulture is a comprehensive subject that gives in depth knowledge of the study of silkworms both physiological as well as commercial purposes including the various processes involved in the formation of silk .

CO4 Students gain knowledge about various systems study of silkworms and cocoons, other defective cocoons

CO5 Reeling and significant diseases seen in the silkworms

CO6 Students feel confident in teaching Sericulture as well as executing research projects

Animal Biotechnology

CO1 It gives insight into various cell/tissues culture techniques

CO2 Understanding of in vitro culturing of organisms and production of transgenic animals.

CO3 Understanding of cloning of mammals, large scale culture and production from recombinant microorganisms

CO4 Gains skills in medical, environmental biotechnology, biopesticides, Biotechnology of aquaculture and use of animals as bioreactors

CO5 This insight allows students to take into consideration about ethical issues involved in production transgenic animals and BT products.

Fish Biology

CO1 Course provides them comprehensive understanding about aquatic ecosystem and various economical important fishes.

CO2 Students gain knowledge in the areas of responses characterization and classification of Ostracoderms, placoderms, acanthodians, holocephali, elasmobranchs.

CO3 Students gain knowledge of integumentary system - basic structure of skin, dermal and epidermal pigments, fins, and scales.

CO4 Understanding of embryogenesis - Early development and post embryonic development

CO5 Understanding of fishes habits and habitats and their functional anatomy

CO6 The students will be well equipped to become very competent in research or teaching fields

CO7 It is one of the small scale industry which can provide the student employment opportunity.

Instrumentation and computer applications in biology

CO1 Understanding of basic concepts of instrumentation such as cell fractionation, homogenation and centrifugation

CO2 Students gain skills in techniques of chromatography, electrophoresis, spectroscopy and radioisotopes

CO3 Students gain skills in histological, immunological and electrophysiological techniques

CO4 Students gain skills in basics of computers, operating systems, overview of programming languages

CO5 Application of internet and statistical bioinformatics in research

Biodiversity and Conservation

CO1 Biodiversity and conservation explore natural landscapes, species and ecosystems and acquires theories and practical methods in preserving environments and organisms.

CO2 Biodiversity refers not only to endangered species but also to every organism, including microbes and fungi.

CO3 Biodiversity and Conservation increase awareness and understanding of how human life depends on preserving animal species and natural ecosystems.

CO4 Biodiversity and conservation is connected to similar disciplines like environmental science, natural resources management and animal sciences.

CO5 Conserving biodiversity in the face of pressures such as land clearing, pest plants and animals and climate change is a challenge facing land managers and policy-makers globally.

CO6 Key threats to biodiversity, including habitat modification and loss, unsustainable resource use, introduced species and climate change.

CO7 Management actions that are used to mitigate threats to biodiversity, including selecting nature reserves, connectivity and wildlife corridors, ecosystem restoration and control of pest plants and animals.

CO8 Policies to conserve biodiversity including financial incentives, market-based instruments (e.g. biodiversity offsetting), ecological triage and adaptive management.

Project

CO1: Make research proposal

CO2: Construct tool of data collection CO3: Learn fieldwork modalities

CO4: Understand the process of data analysis

CO5: Writing research report