Program Outcome

The progress of Zoology has been spectacular since the early 20th century with the contribution of many eminent Zoologists. The followings are some of the program outcomes of Zoology-

1. The giant tree of Zoology nurtures naturalists, systematists, anatomists, physiologists, cytologists, geneticists, embryologists, evolutionists, biophysicists and biochemists, ecologists, and many more.
2. Different branches have emerged as an extreme necessity for mankind such as molecular biology, genetics, drug testing in animals, etc.
3. It emphasizes understanding and analysis of the intra and interrelationships among animals, plants, and microbes as well as with their environment. This knowledge has enabled us to explore complex food webs and food chains and the maintenance of equilibrium among them.
4. Zoology has been serving as a base for various biological sciences like genetics, molecular biology, chromosomal mutation and aberration, human disease, medicine, pest control, drug designing and development, etc. 5. Zoologists can also serve their duty in colleges and universities, as environmentalists, animal ethologist, conservationists, forensics experts, veterinarian, lab technicians, etc.
5. The present curriculum of Zoology would also help the student to learn about entrepreneurship skills in Apiculture, Sericulture, Wildlife photography, Ecotourism, etc. An Add-on certificate course and internship on Sericulture has been introduced in 2022 to help the participants to learn rearing techniques of Sericulture as well as to get selected for various sericulture farms.

Course Outcome

CORE COURSE I
CODE: ZOO-HC-1016
NON-CHORDATES I: PROTISTS TO PSEUDOCOELOMATES

1. The course of Non-chordates I would introduce students with the fascinating animal world along with their habitat, unique and interesting features.
2. The coursewill uplift their critical thinking and would help in enhancing curiosity for animals in-and-around the world.
3. Students could able to know the origin of animals and could relate the knowledge with recent advancement in the field of diseases and pathogenicity.
4. Practical observation for the study of animals would help both in understanding and retaining the theory in a better way making them familiarize with the morphology and anatomy of representatives of various animal phyla.
5. The students would get a basic knowledge of science communication through project writing.

CORE COURSE II

CODE: ZOO-HC-1026
PRINCIPLES OF
ECOLOGY

1. The course would enhance the knowledge of students with the core concepts of ecology like types of ecosystem, laws of limiting factors, climax theories, community characteristics.
2. Apart from that, the section of applied ecology would make students aware about the conservation and management of wildlife and to be a part of it.
3. Understand and analyse the graphs to build scientific temperament related to the unique attributes of population like dynamics, growth models and interaction.
4. The course would provide practical knowledge on the assessment of population density along with the monitoring of the health of aquatic ecosystem.
5. Apart from the academic learning and exposure gained through the visit to a national park/Biodiversity Park/Wild life sanctuary would, the students would learn various ethics like cooperation, management, punctuality and discipline.
6. The report writing would be a scientific learning experience for the students.

CORE COURSE III
CODE: ZOO-HC-2016
NON-CHORDATES II: COELOMATES

1. The classical course of Non-chordatesII would enable students to get familiarize with the basic features of coelomates along with their various systems ranging from digestive system to water vascular system.
2. The study of the non-chordates living in diverse habitats would allow them to appreciate the course. In addition to that, social life of honey bees would help students to learn about the division of labour.
3. Appreciate similarities and differences in life functions among various groups of animals in Phylum Non-chordata.
4. Practical observation of the representatives of various animal phyla would help both in understanding the morphology and anatomy and retaining the theory in a better way.
5. The students would get a basic knowledge of science communication through the project writing.

CORE COURSE IV
CODE: ZOO-HC-2026
CELL BIOLOGY

1. The course would introduce the students with theunique and structural function of life- the cell and the fundamental principle of its biology.
2. The knowledge about different organelle would help them to build a basic foundation to help them understand about various diseases and treatment in the future.
3. The course would enable students to appreciate the processes of how cells grow, divideand comprehend its regulation.

4. understand the structure and consequently to appreciate the functioning of the cell and its components
5. The Course is intended to enable the student to Explain thefunctioning of the machinery of the cell ranging from cell division to the crosstalk of messages in the form of cell signalling.
6. Could able to learn the preparation of temporary as well as permanent slides.
7. Practical preparation of slides of different stages of cell division would help them to visualize the concept in a much better way.
8. Would enable them to have an insight into the DNA and protein through the slide preparation.

CORE COURSE V
DIVERSITY OF CHORDATA
CODE: ZOO-HC-3016

1. The students would learn about the diverse chordates including their distinguishing features, level of organization, diverse habit and habitat in marine, freshwater and terrestrial ecosystems.
2. Understand circulatory, nervous and skeletal system of chordates.
3. The classification of chordates would allow them to critically analyze the diverse and numerous living beings and its evolutionary significance.
4. Practical observation of the representatives of various animal phyla would help both in understanding the morphology and anatomy and retaining the theory in a better way.
5. The students would get a basic knowledge of science communication through the project writing.

CORE COURSE VI
ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS
CODE: ZOO-HC-3026

1. Recognize and explain how all physiological systems work in unity to maintain homeostasis in the body and use of feedback loops to control the same
2. Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.
3. Know the role of regulatory systems viz. endocrine and nervous systems and their amalgamation in maintaining various physiological processes.

CORE COURSE VII
FUNDAMENTALS OF BIOCHEMISTRY
CODE: ZOO-HC-3036

1. Gain knowledge and skill in the fundamentals of biochemical sciences, interactions and interdependence of physiological and biochemical processes.

2. Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation.
3. Know about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments, and analyze the resulting data.
4. Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals.

CORE COURSEVIII
COMPARATIVE ANATOMY OF VERTEBRATES
CODE: ZOO-HC-4016
THEORY

1. Explain comparative account of the different vertebrate systems
2. Understand the pattern of vertebrate evolution, organisation and functions of various systems.
3. Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.
4. 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.
5. Learn the evolution of brain, sense organs and excretory organto a complex, highly evolved form in mammals;
6. 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.
7. Understand the importance of comparative vertebrate anatomy to discriminate human biology.

CORE COURSE IX
ANIMAL PHYSIOLOGY: LIFE-SUSTAINING SYSTEMS
CODE: ZOO-HC-4026

1. Recognize and explain how all physiological systems work in unity to maintain homeostasis in the body and use of feedback loops to control the same
2. Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.
3. Know the role of regulatory systems viz. endocrine and nervous systems and their amalgamation in maintaining various physiological processes.

CORE COURSE X
BIOCHEMISTRY OF METABOLIC PROCESSES
CODE: ZOO-HC-4036

1. Examine the biomolecular receptors and biochemical pathways of cells.

2. Describe the various cascade of metabolic processes.
3. Comprehend the core concepts and find the connection between biochemical pathways.

CORE COURSE XI
MOLECULAR BIOLOGY
CODE: ZOO-HC-5016

1. Describe the basic structure and chemistry of nucleic acids, DNA and RNA
2. Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
3. Elucidate the molecular machinery and mechanism of information transfer processes– transcription and translation-in prokaryotes and eukaryotes;
4. Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons;
5. Give an overview of gene expression regulation in eukaryotes
6. Explain the significance of DNA repair mechanisms in controlling DNA damage; recognise role of RNAs (riboswitches, siRNA and miRNA) in gene expression regulation.
7. Quantitatively estimate concentration of DNA and RNA by colorimetric methods.
8. The course would enable students to appreciate the processes that are happening in our life at a tiny level and how our body works.

CORE COURSE XII
PRINCIPLES OF GENETICS
CODE: ZOO-HC-5026

1. Gain knowledge of the basic principles of inheritance.
2. Comprehend pedigree leading to development of analytical skills and critical thinking enabling the students to present the conclusion of their findings in a scientific manner.
3. Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day- to -day life.
4. 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.

CORE COURSE XIV
EVOLUTIONARY
BIOLOGY
CODE: ZOO-HC-6026

1. Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.
2. Gain knowledge about the relationship of the evolution of various species and the environment they live in.
3. Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.
4. Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.

DISCIPLINE CENTRIC ELECTIVE COURSES
CODE: ZOO-HE-5016

COMPUTATIONAL BIOLOGY and BIOSTATISTICS

1. Explain the basic concepts of Bioinformatics and Biostatistics and its various applications in different fields of biological sciences
2. Describe theoretically sources of biological data, and list various biological databases – nucleic acids, protein sequence, metabolic pathways and small molecule
3. Identify various file formats of sequence data and tools for submission of data in databases as well as retrieval of gene and protein data from databases
4. Annotate gene sequence and protein structure prediction •
5. Perform and explain the underlying mechanisms of pair-wise and multiple sequence alignments and determine phylogenetic relationships
6. Describe various computational tools and methodologies and their application in structural bioinformatics, functional genomics and in silico drug discovery
7. Measure variability (standard deviation, standard error, co-efficient of variance) and hypothesis testing (Z-test, t-Test, chi-square test)

CODE: ZOO-HC-5026
ANIMAL BIOTECHNOLOGY

1. Use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc.
2. Make a strategy to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniqueslearned during this course.
3. Understand better the ethical and social issues regarding GMOs.
4. Use the knowledge for designing a project for research and execute it.

CODE: ZOO-HE-5036
ENDOCRINOLOGY

1. Understand endocrine system and the basic properties of hormones.
2. Appreciate the importance of endocrine system and the crucial role it plays along with the nervous system in maintenance of homeostasis.
3. Gain insight into the molecular mechanism of hormone action and its regulation.
4. Knowthe regulation of physiological process by the endocrine system and its implication in diseases.
5. Gain knowledge about the prevalent endocrine disorders and critically analyze their own and their family`s health issues.

CODE: ZOO-HE-5046
PARASITOLOGY

1. Understand the variation amongst parasites, parasitic invasion in both plants and animals;applicable to medical and agriculture aspects.
2. Help to know the stages of the life cycles of the parasites and the respective infective stages.
3. Develop ecological model, knowpopulation dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system
4. Develop skills and realize significance of diagnosis of parasitic attackand treatment of patient or host.
5. Learn important case studies to highlight interesting researches, serendipities towards the advancement and enrichment of knowledge in the field of Parasitology.

CODE: ZOO-HE-6016
BIOLOGY OF INSECTA

1. Appreciate the diversity of insects.
2. Understand the physiology of Insects which has made them the most successful animals in terms of numbers and variety of species.
3. Get a glimpse of the highly organized social life of insects.

CODE: ZOO-HE-6026
FISH AND FISHERIES

1. Acquire knowledge of physiology, reproduction of fishes.
2. Analyse different kinds of water and identify/differentiate different kinds of fishes.
3. Procure pure fish seed by artificial procedures such as artificial and induced breeding which can learn by visiting any fish farm or demonstrated in research labs in college/Departments
4. Become aware and gain knowledge of In-land and marine Fisheries in India and how it contributes to Indian economy.
5. Know about different kinds of fishing methods and fish preservation which can be employed for export and storage of commercial fishes.
6. Find the reasons behind the depletion of fisheries resources.
7. Develop skills for entrepreneurship or self-employment in their own fisheries-related business.

CODE: ZOO-HE-6036
REPRODUCTIVE BIOLOGY

1. Get in-depth understanding of morphology, anatomy and histology of male and female reproductive organs.
2. Know different processes in reproduction starting from germ cell formation to fertilization and consequent pregnancy, parturition and lactation.
3. Compare estrous and menstrual cycles and their hormonal regulation.
4. Comprehend the interplay of various hormones in the functioning and regulation of the male and female reproductive systems.
5. Know about the diagnosis and management of infertility, including latest methods, technologies and infrastructure in assisted reproduction.
6. Practically understand the modern methods in contraception and their use in family planning strategies.
7. Translate their understanding intodevelopment of products like non-hormonal contraceptives; contribute to drug discovery programmes as well as neonatal and maternal health programmes andwork with family planning teams to understand the needs and preferences of individuals belonging to lower socioeconomic groups.

CODE: ZOO-HE-6046
WILDLIFE CONSERVATION AND MANAGEMENT

1. Become aware about the importance of wildlife in general, and its conservation and management in particular.
2. Comprehend the application of the principles of ecology and animal behaviour to formulate strategies for the management of wildlife populations and their habitats.
3. Understand the management practices required to achieve a healthy ecosystem for wildlife population along with emphasis on conservation and restoration.
4. Knowthe key factors for loss of wildlife and important strategies for their in situ and ex situ conservation.
5. Recognize the techniques for estimation, remote sensing and Global Position Tracking for wildlife.
6. Gain knowledge about the wildlife diseases and the quarantine policies.
7. Know about the Protected Area Networks in India, Ecotourism, Ecology of perturbation and Climax persistence.
8. Perform critical thinking, literature review; scientific writing as well as presentations; and participation in citizen science initiatives with reference to wildlife

ZOO-HE-6056 DISSERTATION
Dissertation of Zoology Specific subject

1. Acquire the skill of problem-making and solution through scientific procedure (Research methodology)

2. Learn hands-on-training on the core concepts
3. Build confidence and knowledge for future career.
4. Encourage students to pursue science.