

**Bharati Vidyapeeth's**  
**Dr. Patangrao Kadam Mahavidyalaya, Sangli.**  
**Department of Zoology B.Sc. (Zoology)**

**Program Outcomes:**

On completion of this course a Graduate student should be able to:

1. Analyze interactions among the various animals of different phyla, their distribution and their relationship with the environment.
2. Understand the basic concepts about chordates and non-chordates, external morphology and understand the various systems.
3. Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
4. To study of developmental of animal and understand the physiological processes of animals and relationship of organ systems.
5. Understands about various concepts of genetics, molecular biology and its importance in human health and study of insect vectors.
6. Gain knowledge of Agro based Small Scale industries like sericulture, apiculture, fish farming, aquaculture, dairy farming and vermicompost preparation.

**Program Specific Outcomes:**

1. Understand the biological diversity and grades of complexity of various animal forms through their systematic classification and comparative structural studies.
2. Understand the nature and basic concepts of developmental biology, genetics, taxonomy, applied Zoology and Biostatistics.
3. Explain the molecular and cellular basis of physiological functions in animals.
4. Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Developmental biology, Genetics, Applied Zoology, Clinical science, tools and techniques of Zoology, Toxicology, Sericulture, Biochemistry, Fish biology, Animal biotechnology, Immunology and research methodology.
5. Recognized the relationship between structure and functions at different levels of biological organization (e. g. Cells Organs, Organisms and Species) for the major group of animal.
6. Understand the applications of biological sciences in apiculture, aquaculture, agriculture, dairy farming and medicine.

## **Course Outcomes:**

### **B. Sc – I (Semester – I)**

#### **Zoology Paper - I (DSC-15A Animal Diversity - I)**

1. State the animal classification and list the various animals in a given phylum.
2. Comment on the modifications of common animal forms of the groups studied.
3. Enlist the examples of the phylum studied.
4. Students will be able to evaluate animals according to the level of organization, body plan, symmetry, germ layers, coelom development etc.

#### **Zoology Paper - II (DSC-16A Cell Biology and Evolutionary Biology)**

1. Understand the concept of a cell and study ultrastructure of prokaryotic and eukaryotic cell.
2. Describe the structure and functions of cell organelles.
3. Describe the concept of origin of life and understanding on the process and theories in evolutionary biology.
4. To study the distribution of animals on earth, its pattern, evolution and causative factors.

### **Semester - II**

#### **Zoology Paper - III (DSC-15B Animal Diversity and Insect Vector)**

1. To study the morphology and various systems in rat.
2. To study mosquito born diseases with respect to their caused organism.
3. To study Housefly born diseases with respect to their caused organism.
4. To study Flea born diseases with respect to their caused organism.

#### **Zoology Paper - IV (DSC-16B Genetics)**

1. Explain Mendel's principle, its extension and chromosomal basis and determination of gene action from genotype to phenotype and concepts of inheritance.
2. Discuss Linkage, crossing Over and Sex Determination with their types and significance.
3. Explain the concept of mendelian genetics, gene, gene regulation and multiple alleles.
4. Identify genetic disorders based on karyotypes and traits.

### **Zoology Practical's (DSC- 15A, B and 16A, B)**

1. Identify various animals based on morphological features.
2. Identify the blood group in human and prepare blood smear and identify the various cells.
3. Stained preparation of mitochondria from oral mucosa by using Janus Green-B.
4. Explain the evidences of evolution.
5. Demonstration of Digestive system, Lungs, Heart, Kidney, Testis, Ovary and Brain of rat.
6. Explain the transmission cycles of pathogens vectored by major arthropod vectors including mosquitoes, Housefly and Flea.

### **B. Sc – II (Semester – III)**

#### **Zoology Paper - V (DSC Animal Diversity - II)**

1. To study general characters and Classification of Protochordates, Agnatha and Pisces.
2. To study the general characters and various systems in frog.
3. To study general characters and Classification of Reptiles (Venomous and non-venomous snakes).
4. To write down general characters and classification of Aves and mammals.

#### **Zoology Paper - VI (DSC Biochemistry)**

1. To study the overall concept of cellular metabolism.
2. Explain the pathways of glucose breakdown and synthesis and their regulation.
3. Describe HMP-pathways and gluconeogenesis.
4. Describe the general properties and classification of enzymes.

### **Semester – IV**

#### **Zoology Paper - VII (DSC Reproductive Biology)**

1. Understand the structure and hormone of pituitary gland.
2. Describe the female reproductive anatomies and explain how the embryo forms from the zygote and foetal development during the three trimesters of gestation.
3. Explain the roles played by the male reproductive tract and accessory glands in the functional maturation, nourishment, storage, and transport of sperm.
4. To study causes diagnosis and management of infertility in male and female.

### **Zoology Paper - VIII (DSC Applied Zoology - I)**

1. Knowledge of some parasitic diseases that could be transmitted between animals and man (Zoonotic diseases).
2. Explain the diseases spread by bacteria.
3. Study of different insect pests.
4. To develop the knowledge of poultry in an operational farm for more profit, management, feed requirements, etc.

### **Zoology Practical – I**

1. Identify animals of higher groups in Invertebrates and Vertebrates.
2. Distinguish between poisonous and non-poisonous snakes.
3. Explain the modifications and adaptations in animals.
4. Explain the use of tools in Pest control.
5. Describe External features and economic importance of freshwater and Marine water fishes and other aquaculture organisms.
6. Develop skill in simple biochemical laboratory procedures.

### **Zoology Practical – II**

1. Identify the histological slides of reproductive organ/tissues.
2. Comment on merits and demerits of contraceptive devices / methods.
3. Perform vaginal smear technique to identify the phases of estrous cycle.
4. Distinguish the male and female anatomical features of reproductive system in mammals.
5. Identify the life cycle stages of few parasites and diseases spread by vectors.
6. Explain the effects of household insects on human health.

### **B. Sc – III (Semester – V)**

#### **Zoology Paper - IX (DSE-E29 Comparative Anatomy of Vertebrates)**

1. Students will have understood the structures of different systems such as, integumentary, skeletal, digestive, respiratory, circulatory, nervous and sensory organs in comparative way among the vertebrate groups.
2. Understand comparative account of the different vertebrate systems.
3. Learn the comparative account of integument, skeletal components, their functions and modifications in different vertebrates.

4. Demonstrate an understanding of the evolutionary history of vertebrates and the evolutionary relationships among different groups of vertebrates.

**Zoology Paper - X (DSE-F29 Molecular Cell Biology and Animal Biotechnology)**

1. Explain the concepts of DNA replication, DNA damage and repair, and gene expression in eukaryotic and prokaryotic organisms.
2. Transcription and Translation in prokaryotes and eukaryotes.
3. Understanding the regulation of gene expression in prokaryotes using operon concept and Eukaryotes.
4. Learn the methods of DNA sequencing and various tools and techniques like DNA isolation, PCR, transformation, restriction of molecular biology.

**Zoology Paper - XI (DSE-F30 Biotechniques and Biostatistics)**

1. Students will understand basic principles and techniques in genetic manipulation and genetic engineering.
2. Students will understand gene transfer technologies for animals and animal cell lines.
3. Demonstrate an understanding of the concepts of mammalian cell culture.
4. Explain the concept and types of central tendency, correlation and regression with their properties.

**Zoology Paper - XII (DSE-F31 Aquatic Biology)**

1. Gain theoretical knowledge in hydrobiology, abiotic factors and aquatic organisms.
2. Comprehend the importance of estuaries, marshes, wetlands and coral reef community.
3. Discuss the aquatic adaptations of common freshwater forms. Illustrate the Physico-chemical properties of water.
4. Structures of the various endocrine glands, their development, their histology and the regulation of hormone synthesis and secretion.

## **B. Sc – III (Semester – VI)**

### **Zoology Paper - XIII (DSE-E30 Developmental Biology of Vertebrates)**

1. Explain the Types of Eggs, fertilization and Cleavage.
2. Students will have knowledge about early development in chick and frog embryology.
3. Students will learn the different aspects of early, late and postembryonic development.
4. Understand the development of multicellular organisms from a single cell zygote.

### **Zoology Paper - XIV (DSE-E32 Immunology)**

1. Overall Immune system of human beings, cells and organs involved in immunity.
2. Understanding of cells and organs of immune systems.. .
3. Students are able to understand basic concepts of Immunology, properties of immune system and types of immunity.
4. Explain the structure, classes and function of antibodies and antigen antibody interaction.

### **Zoology Paper - XV (DSE-E31 Applied Zoology - II)**

1. Explain the basic concepts of apiculture like systematics, colony organization, polymorphism, morphology and foraging.
2. Study of Indigenous, Exotic breeds of cattle and commercial importance of dairy farming.
3. Explain the importance of institutions pertinent to Pearl and prawn culture. Discuss the setup of Pearl business.
4. Aqua culture systems, induced breeding techniques, post harvesting techniques.

### **Zoology Paper - XVI (DSE-F32 Insect Vectors and Histology)**

1. Describe the basic biology (life cycle, reproduction, host-seeking behavior) of major insect vectors.
2. Explain the transmission cycles of pathogens vectored by major arthropod vectors including mosquitoes, Housefly and Fleas.
3. To be able to describe the organs, and to differentiate their histological structures.
4. To be able to describe the normal structure and function of various cell types, tissues, and organs, and to differentiate their histological structures.

## **B. Sc – III (Practical)**

### **Zoology Practical – I**

#### **Comparative anatomy and developmental biology of vertebrates**

1. Explain the anatomical features of brain, heart and skin of vertebrates.
2. To study of developmental study of frog.
3. Prepare permanent slides of chick embryo whole mounts.
4. Sketch, label and explain the whole mounts and transverse sections of chick embryo.
5. To study of histological structure of placenta.
6. To study the gametes of frog and rat.

### **Zoology Practical – II**

#### **Applied Zoology – II and Immunology**

1. Explain the basic concepts of apiculture like casts of honey bees, Bee hive and model of bee hive.
2. To study of freshwater prawn culture, pearl culture and goat farming.
3. Identify the microscopic structure of the lymphoid organs.
4. Demonstrate immuno-electrophoresis technique.
5. Detect the human blood groups by antigen -antibody reactions.
6. Prepare the human blood smear to identify various blood cells.

### **Zoology Practical – III**

#### **Molecular biology, Animal biotechnology, Biostatistics & Biotechniques**

1. To study microtechnique.
2. To study of permanent histological slides HE technique.
3. To study the different types of histochemical technique- AB pH- 1, AB pH- 2.5.
4. Explain the principle and applications of paper chromatographic technique with example.
5. Understand the applications of statistical tools like mean, mode, median, mean deviation, standard deviations.
6. Solve the statistical problems based on Central Tendency, Dispersion, Correlation and regression.

## **Zoology Practical – IV**

### **Aquatic biology, insect vector & diseases**

1. Determination of pH, acidity-alkalinity and hardness of water sample.
2. Determination of dissolved oxygen and free CO<sub>2</sub> of water sample.
3. To study instruments used in limnology and their significance.
4. Description of head- origin, structure and modification; types of mouthparts and antennae.
5. To study the mosquito, sandfly, housefly, flea born diseases.
6. To study histology of mammalian organs.