

## **M.Sc. ZOOLOGY**

### **Programme Specific Outcomes**

- PSO 1 Understand and analyse the ecological and evolutionary significance of different taxa of animals.
- PSO 2 To analyse the mechanisms involved in life processes upto the molecular level.
- PSO 3 To perform the analytical experiments in various fields of biological science.
- PSO 4 To identify a research problem and to formulate a scientific solution.

### **Course Outcomes**

#### **ZL010101 ANIMAL DIVERSITY: PHYLOGENETIC AND TAXONOMIC APPROACHES 72 HOURS, 4 CREDITS**

- CO 1 Understand the Organization and Life: Homology and Analogy, Diversity of invertebrates, Phylogeny of invertebrates
- CO 2 Understand the Origin and development of animals and the Geological time scale
- CO 3 To make the students aware for Paleontology i.e. Fossils and its significance.
- CO 4 To acquire knowledge on the taxonomic status of various Invertebrate animals and animal groups
- CO 5 Understand the Outline classification of Animals: Classification of animals.
- CO 6 Understand the Levels of structural organization.
- CO 7 Understand the principles and methods of taxonomy

#### **ZL010102 EVOLUTIONARY BIOLOGY AND ETHOLOGY 72 Hours, 4 Credits**

At the end of this course the students will be able to:

- CO1: Understand the basic principles and theories of evolution
- CO2: Analyse the evolutionary relationship of different animal taxa
- CO3: Understand the complexity of animal behaviour and its relation to other biological sciences
- CO4: Have research aptitude in the field of behavioural and evolutionary science

#### **ZL010103 BIOCHEMISTRY 72Hours, 4 Credits**

At the end of this course the students will be able to:

CO 1 Demonstrate an understanding of chemical nature of life and life process.

CO 2 Obtain an idea on structure and functioning of biologically important molecules.

CO 3 Understand the importance of metabolism of bio macromolecules in normal physiology of a man.

CO 4 Stay informed about the abnormal metabolism of biomolecules and the resultant diseases.

CO 5 Use current biochemical and molecular techniques to plan and carry out experiments.

### **ZL010104 BIOSTATISTICS AND RESEARCH METHODOLOGY**

**54 hrs, 3 Credits**

CO 1 To understand the concepts of statistics and research methodology and create awareness about the gadgets, tools and accessories of biological research.

CO 2 Help students to improve analytical and critical thinking skills through personal problem solving.

CO 3 To enable learners to effectively apply suitable statistical tests in research and equip them to prepare research papers and project proposals.

CO 4 To sensitize students about the ethics involved in research and enable them to come up with innovative research designs.

### **ZL010201 FIELD ECOLOGY 72 Hours, 4 Credits**

CO1: Understanding on the basic theories and principles of ecology

CO2: Learning various natural resources and their management

CO3: Analysing the human influence on environment and current environmental issues

CO4: Understanding different types of animal adaptations in varying environments

### **ZL010202 DEVELOPMENTAL BIOLOGY 72 Hours, 4 Credits**

CO 1 To understand the developmental process that lead to establishment of body plan of vertebrates and the corresponding cellular and genetic mechanisms.

CO 2 Attain a basic conceptual knowledge about the principal cellular mechanisms of development.

CO 3 To explain the clinical implications of development and the mechanisms intervene in the developmental alterations.

CO 4 To expose the learner to the new developments in embryology and its relevance to man.

### **ZL010203 GENETICS AND BIOINFORMATICS 72 Hours, 4 Credits**

CO 1: To get an in-depth understanding on the principles and mechanisms of inheritance

CO 2: To analyse the fine structure and molecular aspects of genetic material

CO 3: To understand the importance of inheritance in Man and congenital diseases

CO 4: To get acquainted with the field of bioinformatics and able to take up bioinformatics studies

## **ZL010204 MICROBIOLOGY AND BIOTECHNOLOGY**

**54 Hours, 3 Credits**

- CO1: Getting an over view of the microbial world, its structure and function
- CO2: Familiarizing with the applied aspects of microbiology
- CO3: Understanding the modern biotechnology practices and approaches
- CO4: Knowledge on public policy, biosafety, and intellectual property rights issues related to biotechnology

## **ZL010105: PRACTICAL 1 ANIMAL DIVERSITY: EVOLUTIONARY, ETHOLOGICAL AND BIOCHEMICAL METHODS & APPROACHES**

**180 Hours, 4 Credits**

- CO 1 To enable the students to identify and study about different species of vertebrates and Invertebrates and their phylogenetic, morphological, ecological and pathological significance.
- CO 2 Enable them to prepare keys and cladograms using appropriate softwares or tools.
- CO 3 To understand the behaviour and activity pattern of different organisms based on field observation with respect to diurnal and seasonal.
- CO 4 To develop the skills in student to do different statistical analysis using various softwares and onlinetools.

## **ZY2CT09 BIOPHYSICS, INSTRUMENTATION AND BIOLOGICAL TECHNIQUES 90 Hours, 4 Credits**

At the end of this course the students will be able to:

- CO 1 Understand the biophysical properties and functioning of life processes
- CO 2 Have an idea of the different tools and techniques available for studying biochemical and biophysical nature of life
- CO 3 Use the tools and techniques for project work/ research in biology

## **PRACTICAL 2 DIVERSITY OF LIFE: ECOLOGICAL, EMBRYOLOGICAL, HEREDITARY AND MICROBIAL METHODS & APPROACHES 180 Hours, 4 Credits**

- CO 1: To analyse various quality parameters of soil and water and evaluate their influence of biota
- CO 2: To identify various stages of animal development and perform vital staining techniques
- CO 3: To apply bioinformatics tool for the analysis and construction of phylogenetic trees
- CO 4: To identify abnormal karyotypes and mutants
- CO 5: To perform micrometric, microscopic and chromatographic techniques

## **ZY3CT11 ANIMAL PHYSIOLOGY 90 Hrs, 4 Credits**

- CO 1 To study and compare the functioning of organ systems across the animal world

- CO 2 Understand the comparative functioning of different systems in animals.  
CO 3 To acquire deeper knowledge about the fundamental processes and mechanisms that serve and control the various functions of the body  
CO 4 To enhance knowledge and appreciation of mammalian physiology.

### **ZY3CT12 CELL AND MOLECULAR BIOLOGY 90 Hours, 4 Credits**

At the end of this course the students will be able to:

- CO 1 Understand the structural and functional details of the basic unit of life at the molecular level  
CO 2 Understand and explain the basics of cell biology  
CO 3 Explain the new developments in molecular biology and its implications in human welfare

### **ZY3CT14 IMMUNOLOGY 54 Hours, 3 Credits**

- CO 1 To possess an in depth knowledge and new developments in immunology.  
CO 2 To describe the organisation and functioning of the immune system.  
CO 3 To give a detailed description of diagnostic tests of diseases.  
CO 4 To understand different types of vaccines and their role in human health and well being.

### **ZY3CP 15 PRACTICAL 3: CELL AND MOLECULAR BIOLOGY, MICROBIOLOGY AND BIOTECHNOLOGY 72 Hours, 2 Credits**

At the end of this course the students will be able to:

- CO 1 Do the squash preparations of onion root tip, grasshopper testis and salivary gland of drosophila and to identify the mitotic index, different meiotic stages and giant chromosomes respectively.  
CO 2 Prepare microtome sections, spread and do histochemical staining of carbohydrates (PAS), Protein (Bromophenol blue), lipids (Sudan Black) and DNA (Fuelgen stain).  
CO 3 Understand the methodology for plasmid and genomic DNA isolation  
CO 4 Do Sterilization, disinfection and observe safety measures in microbiological laboratory.  
CO 5 Prepare different types of culture media and to do different culture techniques  
CO 6 Identify microorganisms using different tests and to enumerate microorganisms using haemocytometer and turbidimetry.  
CO 7 Perform environmental sample analysis and bacteriological analysis of milk.

### **ZY3CP16 PRACTICAL 4: ANIMAL PHYSIOLOGY AND IMMUNOLOGY 72 Hours, 2 Credits**

- CO 1 Ability to explain physiological processes in detail and on an appropriate level.  
CO 2 Able to perform different immunological techniques like WIDAL Test, Western Blotting, ELISA, Rocket Immuno electrophoresis etc,  
CO 3 Able to analyse different factors affecting enzyme activity and get deep knowledge about the functioning of various hormones and chemicals inside the body.  
CO 4 To familiarise with various softwares related to physiology.

## **ZY4C ET 01 ENVIRONMENTAL SCIENCE: CONCEPTS AND APPROACHES**

**90 Hrs, Credit- 4**

- CO 1 To understand various components of environment and their characteristics in detail and the various phenomena in biosphere.
- CO 2 To enable the students to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth.
- CO 3 Make them aware about different laws and organisations related to biodiversity and conservation.
- CO 4 To understand about environmental economics and green economy for the sustainable utilisation of natural resources.

## **ZY4C ET02 ENVIRONMENTAL POLLUTION AND TOXICOLOGY**

**90 Hrs, 4 Credits**

- CO 1 To provide a broad and deep understanding on environment and influence of man on environment
- CO 2 To equip the students to use various tools and techniques for the study of environment
- CO 3 To enable the learner to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth
- CO 4 To take up further studies and research in the field

## **ZY4C EP04 ENVIRONMENTAL SCIENCE: PRACTICAL –I 90 Hours, 2 Credits**

At the end of this course the students will be able to:

- CO 1 Determine the soil texture, moisture content, soil pH, Chloride, Calcium, Magnesium, Potassium and Phosphorous.
- CO 2 Determine the Calcium Carbonate content of different egg shells.
- CO 3 Estimate the primary productivity of different aquatic systems.
- CO 4 Identify the different trophic levels from the gut analysis of fish.
- CO 5 Understand the biodiversity in Forest/Grass land and Pond/River and to report the species richness, abundance and animal interactions.

## **ZY4C EP05. ENVIRONMENTAL SCIENCE PRACTICAL-II 90 Hours, 2 Credits**

- CO 1: To analyse the various physico-chemical parameters of water
- CO 2: To examine the toxicity of various heavy metals
- CO 3: To isolate and enumerate the microorganisms in soil
- CO 4: To analyse the microbiological quality of water
- CO 5: To elucidate the histo-pathological changes in tissues