

## **DEPARTMENT OF ZOOLOGY**

### **CORE T1: NON CHORDATES 1**

#### **COURSE OBJECTIVES:**

To enable the learners

1. To introduce the basics of Animal classification and concept of classification (Whittakar and Carl Woese)
2. To acquaint students with general characters and classification of different phyla from protozoa to nematodes.
3. To describe the life cycle of protozoan parasite, platyhelminth parasite and nematode parasite.
4. To provide conceptual knowledge on the evolution of symmetry and segmentation of metazoa.
5. To introduce the concept on metagenesis and polymorphism in Cnidaria.
6. To discuss the coral reef diversity and their function and conservation.

#### **COURSE OUTCOME:**

Students are expected

1. To define Systematics and Taxonomy and to describe the codes of zoological nomenclature.
2. To describe the general characters and recall the classification of different phyla.
3. To explain the life cycles of different parasites.
4. To differentiate the different forms of symmetry and understand the importance of segmentation in metazoan
5. To describe metagenesis and different forms of polymorphism.
6. To recognise the different forms of coral reefs and understand their importance in ecosystem.

## **CORE T2: ECOLOGY SEM-I**

### **COURSE OBJECTIVES :**

The larger objective of the study of ecology is to understand the nature of environmental influences on individual organisms, their populations, and communities, on ecoscapes and ultimately at the level of the biosphere. If students can achieve an understanding of relationships, they will be well placed to contribute to the development of systems by which humans could sustainably use ecological resources.

The purpose of the study is to give an insight to various topics related to ecology which are as follows:

1. Distinguished between species, populations, communities, ecosystems and biomes.
2. Understand the factors that affect population size, density, distribution, and dynamics.
3. Know the exponential growth curve and s-curve.
4. Know what factors control carrying capacity.
  - a. Density dependent
  - b. Density independent
5. Distinguish the following terms
  - a. Habitat
  - b. Niche
  - c. Symbiosis
  - d. Competition
  - e. Predation
  - f. Mutualism
  - g. Commensalism
  - h. Parasitism
6. Describe species interactions
  - a. Intraspecific
  - b. Interspecific
7. Describe succession in a community.
8. Understand how materials and energy are flowing through any ecosystem.
9. Describe various trophic levels and their roles in ecosystem.
10. Compare and contrast terrestrial, aquatic and marine ecosystems.

### **OUTCOME:**

Students attain the basic knowledge of fundamental and applied ecology, which will enable their further education at the University postgraduate studies and researches in the field of ecology. They will be able to differentiate and distinguish the various types of ecosystems. With a clear understanding of the biotic and abiotic factors, they will be able to explain the importance of energy flow and material recycling in nature. They will be able to understand the importance of every species in the ecosystem and value the importance of protecting and preserving them. The relation of the species, population and the community will help them to take positive steps in the areas of global health and preservation of Natural Resources.

## **CORE T3: NON CHORDATES II**

### **COURSE OBJECTIVES:**

To enable the learners

1. To understand the evolution of coelom and metamerism.
2. To understand the taxonomic portion of Annelids to Hemichordata.
3. To understand the general characters of animals belonging to Annelida upto Hemichordata.
4. To classify the animals belonging to Annelida upto Hemichordata.
5. To acquaint the students with excretion in Annelida through nephridia and locomotion in *Neries*.
6. To discuss vision in insects, respiration in Arthropoda and metamorphosis in insects.
7. To explain the evolutionary significance and affinities of *Peripatus*.
8. To describe the nervous system and torsion and detorsion in Gastropoda.
9. To provide conceptual knowledge on the water vascular system in Echinodermata and various larval forms.

### **COURSE OUTCOME:**

#### **Students are expected**

1. To classify animals on the basis of coelom and describe different types of metamerism and their significance.
2. To recall and write the systematic position of Annelids to Hemichordata.
3. To describe unique characters of annelids, arthropods, molluscs, echinoderms and hemichordates.
4. To recall the classification of different phyla from annelids to hemichordates.
5. To list all the different types of nephridia in annelids and describe locomotion in *Neries*.
10. To describe the different parts of compound eye, respiration in Arthropoda and recognise the different types of metamorphosis in insects.
11. To comprehend the evolutionary significance and affinities of *Peripatus*.
12. To draw the nervous system and explain torsion and detorsion in Gastropoda.
13. To describe the water vascular system in Echinodermata and identify the different larval forms.

## **Core T4 - Cell Biology**

### **OBJECTIVES:**

**1.** The students will be introduced to the basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma.

**2.** To be familiar with the ultra structure and composition of Plasma membrane: Fluid mosaic model and mechanism of Transport across membrane: Active and Passive transport, Facilitated transport and knowledge of Cell junctions: Tight junctions, Gap junctions and Desmosomes.

**3.** To familiarise the students with the Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus and Lysosomes.

To understand the Protein sorting and mechanisms of vesicular transport.

**4.** Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis, Mitochondrial

Respiratory Chain, Chemi-osmotic hypothesis Peroxisomes: Structure and Functions  
Centrosome: Structure and Functions

**5.** To understand the types and function of cytoskeleton and have a clear understanding of structure of microtubules and microfilaments in terms of molecular makeup related to proteins.

A brief idea about molecular motors will be discussed as well.

**6.** The Structure of Nucleus, the Nuclear envelope and the Nucleolus along with Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome) will be explained.

7 To discuss the concept of Cell cycle and its regulation and emphasize on the difference between mitosis and meiosis and its significance. Cancer (Concept of oncogenes and tumor suppressor genes) will be explained in brief.

8. They will have a concept of Cell signalling transduction pathways; Types of signaling molecules and receptors along with GPCR and Role of second messenger (cAMP), Protein kinase and  $\text{Ca}^{+2}$

Apoptosis and Necrosis- (brief idea).

## **OUTCOME :**

1. The students are expected to gain knowledge to differentiate Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma.
2. The students will have clear of the different molecules that comprises the structure of plasma membrane and the ways they facilitate the transport mechanism in and out of the cells. They will be able to understand the difference between facilitated transport, active and passive transport
3. The students will be able to understand the structure and related function of the organelles in a cell such as Endoplasmic Reticulum, Golgi Apparatus and Lysosomes.
4. The students will be able to understand the structure and function of Mitochondria as the energy producing organelle in a cell. They will be able to explain the respiratory chain, along with endosymbiotic and chemiosmotic hypothesis.
- 5 The students should be able to differentiate the molecular structure of microtubules and microfilaments and explain the structure of skeletal framework.
6. The students should be able to explain the ultra structure of nucleus, nuclear envelope and nucleolus in relation to the importance of the organelle as the central coordinating centre of a cell.
7. The students will gain knowledge to understand the different types of cell division and its significance in vegetative and reproductive cells
8. The students should be able to explain and write on the. Cell signalling and transduction pathways.

## **Core T5 – CHORDATES**

### **OBJECTIVES:**

Unit 1: To understand the main characteristic features of Phylum Chordata and general characteristic features upto Class level.

Unit 2: To classify Urochordates and Cephalochordates upto Class Level and understand the Retrogressive metamorphosis in *Ascidia* and feeding in *Branchiostoma*.

Unit 3: To understand how the chordates originated and related theory of their origin.

Unit 4: To explore the characteristic features of cyclostomes upto order level. The process of metamorphosis in Lamprey and the zoological importance of ammocoete larva.

Unit 5: To familiarise the students with two major classes of fishes, the Chondrichthyes and Osteichthyes. The students will learn the process of migration and parental care in fishes and the diversity in the structure of swim bladder in fishes.

Unit 6: To understand the classification of Amphibia up to living orders along with parental care, metamorphosis, neoteny and paedogenesis.

Unit 7: To classify Class Reptilia up to living orders with deeper insight into the biting mechanism of snakes and the poison apparatus.

Unit 8: To learn the characters and classification of Aves. To understand the mechanism of migration in birds, their exoskeletal structures and double respiration. The students will understand the aerodynamics and principles of flight.

Unit 9: the students will learn to classify Mammals up to living orders, the exoskeletal structures, adaptive radiation and echolocation in bats,

Unit 10. The Continental Drift theory, and animal distribution globally with a detailed understanding of Zoogeographical Realms.

## **OUTCOME**

The students will have the concept of lower chordates (Protochordata) and higher chordates and the importance of the study of *Ascidia* and *Branchiostoma*.

The students shall have a detailed understanding about the structure of the pharynx associated with filter and ciliary feeding in lower chordates.

The students will be able to understand that the vertebrates are more advanced in structure and function than the protochordata.

The students will be able to distinguish the vertebrates from invertebrates and should be able to understand the characteristic features of Chordates.

The students shall be able to classify any class of vertebrates and able to correlate the theoretical knowledge with local specimens.

The students will be able to discuss the unique adaptive capabilities of vertebrates such as accessory respiration in fishes, parental care in amphibia, adaptation of birds as a flying machine and echolocation in bats should enrich the students with the evolutionary processes in different classes of vertebrates.

The students will be able to explain the concept of understanding the mechanisms of progressive and retrogressive metamorphosis should be understood by the students.

The students will be able to describe the development of special structures in animals such as the poison apparatus in snakes, feathers in birds and locomotory appendages in mammals as a result of adaptive radiation should be clear to the students.

The student will be able to realise the diversity of ecosystems globally and its relation to animal distribution in the Zoogeographical Realms. It should make the students to relate the diversity of life (higher vertebrates ) in different parts of the globe .

### **Core T6 – Animal physiology: Controlling and coordinating systems.**

#### **OBJECTIVES:**

From this lesson, the students will be able to know:

1. How animals work and the biological processes essential for animal life, at levels of organization from membranes to the whole animal.
2. In its broad sense it includes the scientific disciplines of tissues, bone and cartilage, nervous system, muscular system, reproductive system and endocrine system.
3. The role of the nervous system in coordinating an animal's response to environment and organ system of human body.
4. The nervous system gathers, sorts and stores information and initiates movement
5. The basic structure and function of a neuron, the structure and function of a synapse and neurotransmitter chemicals.
6. The nervous pathway known as a reflex with examples.
7. That the nervous system can be divided into the central and peripheral nervous systems.
8. That the peripheral nervous system and autonomic nervous system
9. How the endocrine system and endocrine glands in animals help in the chemical coordination.
10. Histology and function of pituitary, thyroid, pancreas and adrenal gland.

#### **OUTCOMES:**

At the end of this unit students should be able to recognize the need for control and coordination in the body of organisms., various hormones and discuss about their functions, understand that nerve cell is the basic structural and functional unit of nervous system, understand significance of nervous system, reproductive system, muscular system, structural integration of tissues, bones and cartilages in human body.

### **CC7: GENETICS**

#### **COURSE OBJECTIVES:**

To enable the learners

1. To understand the basic principles of Mendelian inheritance.
2. To provide conceptual knowledge on linkage and crossing over and chromosome mapping.
3. To introduce the types of gene mutations, types of chromosomal aberrations.
4. To discuss the mechanisms of sex determination in *Drosophila* and mammals.
5. To analyse the criteria for extra chromosomal inheritance, antibiotic resistance in *Chlamydomonas*.
6. To learn recombination in bacteria and viruses, conjugation, transformation and transduction.

**COURSE OUTCOME:**

Students are expected

1. To demonstrate knowledge of the basic principles of Mendelian genetics.
2. To explain the process of linkage and crossing over and apply the principles in measuring recombination frequency.
3. To classify different types of gene mutations and chromosomal aberrations.
4. To differentiate the different mechanisms of sex determination.
7. To recall the criteria for extra chromosomal inheritance and explain the antibiotic resistance in *Chlamydomonas*.
8. To explain recombination in bacteria and viruses, and differentiate between conjugation, transformation and transduction.

**SKILL ENHANCEMENT COURSE**

**SEC T1: APICULTURE**

**COURSE OBJECTIVES:**

To enable the learners

1. To understand the basics of Apiculture, classification, biology and social organization of honey bees.
2. To provide conceptual knowledge on artificial bee rearing and bee hives- Newton and Langstroth.
3. To study about bee diseases and enemies and its control and preventive measures.
4. To discuss the products of apiculture industry and its uses.
5. To provide knowledge regarding entrepreneurship in apiculture by enabling them to understand the modern methods in employing artificial beehives for cross pollination in horticultural gardens.

**COURSE OUTCOME:**

**Students are expected**

1. To name the different classes of honeybees and to have a preliminary knowledge regarding Apiculture.
2. To explain the process of artificial bee rearing and the framework of Newton and Langstroth hive.
3. To classify different types of bee diseases and enemies and to know about its control and preventive measures
4. To recall the different products of apiculture industry and their uses.
5. To differentiate the different mechanisms of sex determination.
6. To apply the knowledge of Apiculture entrepreneurship and utilize it to employ artificial bee hives.