

**PS Government Degree College**

**Penukonda**

**Programme**

**B.Sc. Honours in Zoology (Major)**

**Course Outcomes**

**wef 2023-24**

# **Course Outcomes**

## **SEMESTER-I**

### **COURSE 1: INTRODUCTION TO CLASSICAL BIOLOGY THEORY**

#### **LEARNING OBJECTIVES**

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

#### **LEARNING OUTCOMES**

1. Learn the principles of classification and preservation of biodiversity
2. Understand the plant anatomical, physiological and reproductive processes.
3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

## **SEMESTER-I**

### **COURSE 2: INTRODUCTION TO APPLIED BIOLOGY THEORY**

#### **LEARNING OBJECTIVES**

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

#### **LEARNING OUTCOMES**

1. Learn the history, ultrastructure, diversity and importance of microorganisms.
2. Understand the structure and functions of macromolecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data

## **SEMESTER-II**

### **COURSE 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES THEORY**

#### **LEARNING OBJECTIVES:**

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to protozoa to hemichordata.
- To understand the structural organization of animals phylum from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phyla from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

#### **LEARNING OUTCOMES:**

By the completion of the course the graduate should able to –

- Describe concept of animal kingdom classification and general characters of Protozoa
- Classify Porifera and Coelenterata with taxonomic keys
- Classify Phylum Platy & Nematelminthes using examples, parasitic adaptation
- Describe Phylum Annelida & Arthropoda using examples and economic importance of vermicomposting & economic importance of insects.
- Describe Mollusca, Echinodermata & Hemi chordata with suitable examples in relation to the phylogeny

## **SEMESTER-II**

### **COURSE 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES PRACTICAL**

#### **LEARNING OBJECTIVES**

- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labelled record of identified museum specimens

## **SEMESTER-II**

### **COURSE 4: CELL & MOLECULAR BIOLOGY THEORY**

#### **LEARNING OBJECTIVES**

- To understand the cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities
- To acquaint the students with the concepts of cell division and cell cycle
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To acquaint the students on the biological importance of biomolecules.

## **LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell and molecular biology by the completion of the course the graduate shall able to –

- Understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- Explain the cell cycle and bioenergetics of the cell
- Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins
- Understand the gene expression phenomenon and biological importance of biomolecules

## **SEMESTER-II**

### **COURSE 4: CELL & MOLECULAR BIOLOGY PRACTICAL**

#### **LEARNING OBJECTIVES**

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad geological history of origin & evolution of animals

### **SEMESTER-III**

#### **COURSE 5: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES THEORY**

##### **LEARNING OBJECTIVES**

- To understand the animal kingdom.
- To understand the taxonomic position of Protochordata to Mammalia.
- To understand the general characteristics of animals belonging to Fishes to Reptilians.
- To understand the body organization of Chordata.
- To understand the taxonomic position of Protherian mammals.

##### **LEARNING OUTCOMES:**

By the completion of the course the graduate should be able to –

- Describe general taxonomic rules on animal classification of chordates
- Classify Protochordata to Mammalia with taxonomic keys
- Understand Mammals with specific structural adaptations
- Understand the significance of dentition and evolutionary significance
- Understand the origin and evolutionary relationship of different phyla from Protochordata to Mammalia.

### **SEMESTER-III**

#### **COURSE 5: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES PRACTICAL**

##### **LEARNING OBJECTIVES**

- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labelled record of identified museum specimens

### **SEMESTER-III**

#### **COURSE 6: PRINCIPLES OF GENETICS THEORY**

##### **LEARNING OBJECTIVES**

- To provide the background knowledge on the history of genetics and the importance of Mendelian principles.
- To provide the required knowledge on the gene interactions
- To acquaint the students, distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance and extrachromosomal inheritance.
- To understand the principles of sex determination in animals with a reference to human being, and sex-linked inheritance
- To understand the human karyotyping and the concept of pedigree analysis basics.

##### **LEARNING OUTCOMES:**

By the completion of the course the graduate should be able to –

- To understand the history of genetics, gain knowledge basic terminology of genetics
- To acquire knowledge on interaction of genes, various types of inheritance patterns existing in animals with reference to non-Mendelian inheritance.
- To acquire knowledge on chromosomal inheritance
- Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination,
- Acquiring in-depth knowledge on human karyotyping, pedigree analysis and chromosomal disorders concepts of proteomics and genomics

### **SEMESTER-III**

#### **COURSE 6: PRINCIPLES OF GENETICS PRACTICAL**

##### **LEARNING OBJECTIVES**

- To acquire practical knowledge on the importance of Mendelian principles by solving the problems.
- To provide the required knowledge on the gene interactions
- To acquaint the students on Human karyotype & pedigree analysis basics
- To understand the various genetic concepts through Virtual labs

### **SEMESTER-III**

#### **COURSE 7: ANIMAL BIOTECHNOLOGY THEORY**

##### **LEARNING OBJECTIVES:**

- To provide knowledge on animal cell and tissue culture and their preservation
- To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
- To explain in vitro fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To understand principles of animal culture, media preparation.

##### **LEARNING OUTCOMES:**

This course will provide students with a deep knowledge in animal biotechnology, by the completion of the course the graduate shall able to –

- Get knowledge of the Vectors and Restriction enzymes used in biotechnology
- Describe the gene delivery mechanism and PCR technique
- Acquire basic knowledge on media preparation and cell culture techniques
- Understand the manipulation of reproduction with the application of biotechnology
- Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

### **SEMESTER-III**

#### **COURSE 7: ANIMAL BIOTECHNOLOGY PRACTICAL**

##### **LEARNING OBJECTIVES**

This course will provide students with a practical knowledge in animal biotechnology, by the completion of the course the graduate shall able to –

- Acquire knowledge on Cloning vectors widely used in biotechnology
- Empower with the process of DNA quantification and amplification
- Explain purification of biological compounds by paper chromatography
- Get insight maintenance of laboratory apparatus
- Understand principles of animal culture, media preparation

### **SEMESTER-III**

#### **COURSE 8: EVOLUTION AND ZOOGEOGRAPHY THEORY**

##### **LEARNING OBJECTIVES**

- To provide knowledge on origin of life, theories and forces of evolution
- To explore the evidences of evolution
- To Explain the theories of evolution
- To understand the role of variations and mutations in evolution of organisms
- To understand the zoogeographical distribution of animals

##### **LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Evolution and zoo geography, by the completion of the course the graduate shall able to –

- Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals
- Explain the different evidences of evolution
- Understand the theories of evolution
- Explain the various tools for evolution
- Map the distribution of animals according to zoological realms

### **SEMESTER-III**

#### **COURSE 8: EVOLUTION AND ZOOGEOGRAPHY PRACTICAL**

##### **LEARNING OBJECTIVES**

- Acquainting and skill enhancement in the usage of laboratory equipment
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad geological history of origin & evolution of animals
- To understand the zoogeographical distribution of animals

## **SEMESTER-IV**

### **COURSE 9: EMBRYOLOGY THEORY**

#### **LEARNING OBJECTIVES**

- The objective of this course is to provide a comprehensive understanding of the concepts of early animal development.
- Students taking this course must develop a critical appreciation of methodologies specifically used to study the process of embryonic development in animals.
- In this course different concepts of animal development will be elaborated
- Students will be made familiar with different approaches that have been used to study embryology.
- Topics that will be discussed are organogenesis and regeneration.

#### **LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of concepts of embryology. This course will provide students with a deep knowledge in embryology by the completion of the course the graduate shall able to –

- Understand the historical perspective and concepts of embryology
- Acquire knowledge on gametogenesis, fertilization and cleavage patterns
- Understand the fate of germinal layers and extraembryonic membranes
- Explain the process of regeneration in certain animals
- Examine the process of organogenesis

## **SEMESTER-IV**

### **COURSE 9: EMBRYOLOGY PRACTICAL**

#### **LEARNING OBJECTIVES**

- The objective of this course is to provide a comprehensive practical knowledge on the embryology
- Must develop a critical understanding of the early embryological events
- Acquire knowledge on the developmental stages of chick
- Understand the histology of placenta

## **SEMESTER-IV**

### **COURSE 10: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS THEORY**

#### **LEARNING OBJECTIVES**

- To acquire knowledge of organ systems function.
- To develop the ability to integrate physiology from the cellular and molecular level to the organ system and organismic level of organization.
- To Effectively read, evaluate and communicate scientific information related to physiological processes in the body.
- To gain a deep knowledge of current topics in physiology.



## **LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of concepts of Physiology. This course will provide students with a deep knowledge in physiology by the completion of the course the graduate shall able to –

- Understand the physiology of digestion and hormonal control of digestion
- Develop a comprehensive picture of respiratory physiology
- Acquire knowledge on the Renal physiology
- Understand the physiology of Nerve and muscle
- Understand the physiology of heart

## **SEMESTER-IV**

### **COURSE 10: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS PRACTICAL**

#### **LEARNING OBJECTIVES**

- To acquire knowledge of anatomy of certain important organs.
- To develop the ability to test the biological sample like saliva and urine.
- To Effectively estimate the blood haemoglobin.
- To Acquire skill to use the sphygmomanometer in recording blood pressure.
- To observe the ECG

## **SEMESTER-IV**

### **COURSE 11: IMMUNOLOGY THEORY**

#### **LEARNING OBJECTIVES**

- To promote critical thinking among students.
- To provide students with a foundation in immunological processes
- To provide students with knowledge on how the immune system works building on their previous knowledge
- To clearly state the role of the immune system.
- To compare and contrast the innate versus adaptive immune systems.
- To provide an overview of the interaction between the immune system and pathogens.

#### **LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of concepts of immunology. This course will provide students with a deep knowledge in immunology by the completion of the course the graduate shall able to –

- Articulate the roles of innate recognition receptors in immune responses
- Compare and contrast humoral versus cell-mediated immune responses
- Distinguish various cell types involved in immune responses and associated functions;
- Distinguish and characterize antibody isotypes, development, and functions
- Understand the role of cytokines in immunity and immune cell activation;

- Understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation

#### **SEMESTER-IV**

#### **COURSE 11: IMMUNOLOGY PRACTICAL**

#### **LEARNING OBJECTIVES**

- To acquire knowledge on the distribution of lymphoid organs
- To study the histology of lymphoid organs
- To acquaint with the process of blood grouping with kit
- To acquaint with the ELISA test
- To acquaint with the Widal test

## **SEMESTER-V**

### **COURSE 12: POULTRY MANAGEMENT-I (POULTRY FARMING) THEORY**

#### **LEARNING OUTCOMES:**

Students at the successful completion of the course will be able to

- Evaluate the status of Indian Poultry Industry
- Explain the Scientific Poultry keeping
- Compare the diversified Poultry practices
- Inspect the different breeds of chicken

## **SEMESTER-V**

### **COURSE 12: POULTRY MANAGEMENT-I (POULTRY FARMING) PRACTICAL**

#### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Identify different types of Poultry rearing practices
- Evaluate the efficacy of different types of poultry practices in maximizing yield
- Understand the importance of different hybrid breeds in poultry

## **SEMESTER-V**

### **COURSE 13: POULTRY MANAGEMENT-II (POULTRY PRODUCTION AND MANAGEMENT) THEORY**

#### **LEARNING OUTCOMES:**

Students at the successful completion of the course will be able to

- Suggest measure for Health care in Poultry
- Evaluate the economics of poultry production
- Elaborate the poultry Breeder flock management
- Differentiate the poultry hatchery practices

## **SEMESTER-V**

### **COURSE 13: POULTRY MANAGEMENT-II (POULTRY PRODUCTION AND MANAGEMENT) PRACTICAL**

#### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Identify Poultry diseases by observation
- Analyze Poultry establishment feasibility
- Understand the Poultry Records

## **SEMESTER-V**

### **COURSE 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT THEORY**

#### **LEARNING OUTCOMES:**

Students at the successful completion of this course will be able to

- Evaluate the present status of aquaculture at the Global level and National level
- Classify different types of ponds used in aquaculture
- Demonstrate induced breeding of carps
- Acquire critical knowledge on commercial importance of shrimps
- Identify fin and shell fish diseases

## **SEMESTER-V**

### **COURSE 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT PRACTICAL**

#### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Identify the characters of Fresh water cultivable species
- Estimate physico chemical characteristics of water used for aquaculture
- Examine the diseases of fin and shell fish
- Suggest measures to prevent diseases in aquaculture

## **SEMESTER-V**

### **COURSE 14 B: LIVE STOCK MANAGEMENT -I (BIOLOGY OF DAIRY ANIMALS) THEORY**

#### **LEARNING OUTCOMES:**

Students at the successful completion of the course will be able to

- Select the suitable breeds of livestock for rearing
- Relate the anatomy of udder with let-down of milk
- Identify and manipulate the reproductive behaviour of cattle
- Inspect economics of dairy farming
- Apprise the various breeding techniques employed in live stock

## **SEMESTER-V**

### **COURSE 14 B: LIVE STOCK MANAGEMENT -I (BIOLOGY OF DAIRY ANIMALS) PRACTICAL**

#### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to

- Examine the points of dairy cow
- Understand the behavioural changes of cow during the reproductive period

- Differentiate the merits and demerits of cross breeds in cattle

#### **SEMESTER-V**

#### **COURSE 15 A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES THEORY**

##### **LEARNING OUTCOMES:**

Students at the successful completion of this course will be able to

- Identify the types of preservation methods employed in aquaculture
- Choose the suitable Processing methods in aquaculture
- Maintain the standard quality control protocols laid down in aqua industry
- Identify the best Seafood quality assurance system

#### **SEMESTER-V**

#### **COURSE 15 A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES PRACTICAL**

##### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation
- Analyze the protocols of aqua processing methods

#### **SEMESTER-V**

#### **COURSE 15 A: LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT) THEORY**

##### **LEARNING OUTCOMES:**

Students at the successful completion of the course will be able to

- Identify and suggest the suitable housing system for the dairy farming
- Understand management practices for the dairy farming
- Learn the process of milk pasteurization
- Prepare cream from milk

#### **SEMESTER-V**

#### **COURSE 15 B: LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT) PRACTICAL**

##### **LEARNING OUTCOMES:**

On successful completion of this practical course, student shall be able to:

- Design a model dairy farm layout
- Understand procedure of milk pasteurization at milk processing centers
- Identify various important management practices in dairy farming