

## **PROGRAM OUTCOME AND COURSE OUTCOMES OF UNDERGRADUATE COURSE**

### **B.Sc ZOOLOGY**

#### **AIMS AND OBJECTIVES**

The Board of Studies in Zoology (UG) recognizes that curriculum, course content and assessment of scholastic achievement play complementary roles in shaping education. The revised Outcome Based Education- Choice Based Credit and Semester System for Under Graduate (UG) Curriculum for B.Sc. Zoology Programme envisages undergraduate education as a combination of general and specialized education with outcome based, simultaneously introducing the concepts of breadth and depth in learning. Besides recalling information, the learning process is aimed to acquire the ability for problem solving, and critical and creative thinking in students. The present attempt is to prepare the students for lifelong learning by drawing attention to the vast world of knowledge of animals and introducing them to the methodology of systematic academic enquiry. The crew of the syllabus ensures firm footing in fundamental aspects of Zoology and wide exposure to modern branches of Zoology to the students.

The expected outcome of the syllabus:

- To know the scope and importance of Zoology.
- To develop scientific temper among students.
- To inculcate interest in nature and living forms and their conservation.
- To make the students eco-friendly by creating a sense of environmental awareness in them.
- To give better exposure to the diversity of life forms.
- To give awareness about natural resources and their importance in sustainable development.
- To study different ecological sites for animals in their natural habitats by field study.
- To provide opportunities for the application of the acquired knowledge in day- to - day life.
- To develop skills in doing experiments, familiarizing equipments and biological specimens.
- To undertake scientific projects which help to develop research aptitude in students.
- To expose students to various fields in biological sciences and to develop interest in related disciplines.
- To attain interdisciplinary approach to understand the application of the subject in daily life.
- To familiarize the emerging areas of Zoology and their applications in various spheres of biological sciences and to appraise the students of its relevance in future studies.

### **Programme Outcomes (POs) for General Undergraduate Programme**

**PO1. Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO2. Problem Solving:** Understand and solve the problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired from humanities/sciences/mathematics/social sciences.

**PO3. Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

**PO4. Effective Citizenship:** Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**PO5. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

**PO6. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of sociotechnological changes.

### **Programme Specific Outcomes (PSOs)**

PSOs are specific to a programme and are to be attained at the time of graduation from the programme. They are to be identified by a committee with representation from all stakeholders.

#### **B.Sc. Zoology Programme PSOs Program Specific Outcomes**

**PSO1** Understand the biological diversity and grades of complexity of various animal forms through their systematic classification and process of organic evolution.

**PSO2** Understand the roles of plants, animals and microbes in the sustainability of the environment and their interaction among themselves and deterioration of the environment due to anthropogenic activities.

**PSO3** Understand the concepts and principles of biochemistry, immunology, physiology, ethology, endocrinology, developmental biology, cell biology, genetics, molecular biology and microbiology and develop technical skills in biotechnology, bioinformatics and biostatistics.

**PSO4** Perform laboratory procedures as per standard protocols in the areas of animal diversity, systematics, cell biology, genetics, biochemistry, molecular biology, microbiology, physiology, immunology, developmental biology, environmental biology, ethology, evolution and science methodology.

### **Course Outcomes (COs)**

Course outcomes are statements that describe significant and essential learning that the learners have achieved and can reliably demonstrate at the end of the course. Course outcomes are what the student should be able to do at the end of the course.

## **FIRST SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- I [Theory] ANIMAL DIVERSITY: NON-CHORDATA PART- I Code: ZOL1B01T [DIVERSITY, ADAPTATIONS AND FUNCTIONAL ANATOMY OF PROTOZOANS AND ACOELOMATE AND PSEUDOCOELOMATE NON-CHORDATES]

### **Course Outcome Statements**

- CO1 Describe the principles of classification and nomenclature.
- CO2 Explain the five-kingdom classification of living organisms.
- CO3 Understand the concepts of classification of animals.
- CO4 Explain the classification with examples and characteristic features of kingdom Protista and describe the morphology and structural organization of Paramecium.
- CO5 Describe the characteristic features of subkingdom Mesozoa.
- CO6 Explain the classification of phylum Porifera and elucidate the salient features of each class.
- CO7 Describe the characteristic features of phylum Cnidaria and Ctenophora, illustrate the classification of phylum Cnidaria down to classes and explain the structural organization of Obelia.
- CO8 Explain the salient features of phylum Platyhelminthes and illustrate its classification down to classes.
- CO9 Explain the characteristic features and classification of super-phylum Aschelminthes and phylum Nematoda.
- CO10 Elucidate the characters of Pseudocoelomate minor phyla Rotifera and Gastrotricha.

## **SECOND SEMESTER B. Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- II (Theory) ANIMAL DIVERSITY: NON-CHORDATA PART – II Code: ZOL2B02T [DIVERSITY, ADAPTATIONS & FUNCTIONAL ANATOMY OF COELOMATE NON-CHORDATES]

### **Course Outcome Statements**

- CO1 Explain the classification with examples and characteristic features of phylum Annelida and describe the morphology and structural organization of Nereis.
- CO2 Describe the distribution, peculiarities and affinities of phylum Onychophora.
- CO3 Explain the classification of phylum Arthropoda; elucidate the salient features of each class and describe the morphology and structural organization of Penaeus.
- CO4 Describe the characteristic features of phylum Mollusca, illustrate its classification down to classes and explain the structural organization of Pila globose.
- CO5 Explain the salient features of phylum Echinodermata and illustrate its classification down to classes.
- CO6 Understand the salient features and affinities of phylum Hemichordata .
- CO7 Elucidate the characters of coelomate minor phyla Phoronida, Ectoprocta and Echiura.

### **THIRD SEMESTER B. Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE – III (Theory) ANIMAL DIVERSITY: CHORDATA PART - I CODE: ZOL3B03T  
[TAXONOMY, DIVERSITY, STRUCTURAL ANATOMY AND ADAPTATIONS OF CHORDATES]

#### **Course Outcome Statements**

- CO1 Explain the characteristics of chordates and outline classification of the phylum Chordata.
- CO2 Describe the salient features and affinities of subphylum Urochordata and its classification down to classes; elucidate the morphology and structural organization of Ascidia.
- CO3 Explain the salient features and affinities of subphylum Cephalochordata with reference to Branchiostoma.
- CO4 Describe the salient features of subphylum Vertebrata, illustrate its classification down to classes and elucidate the characteristics of division Agnatha.
- CO5 Enumerate the salient features of superclass Pisces and illustrate its classification down to orders and the morphology and structural organization of Mugil cephalus.
- CO6 Describe the salient features and affinities of class Amphibia and its classification up to orders; explain the morphology and organ systems of Hoplobatrachus tigerinus.
- CO7 Elucidate the characteristic features of the class Reptilia and its classification down to orders; describe the morphology and organ systems of Calotes versicolor.

### **FOURTH SEMESTER B. Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE-IV (Theory) ANIMAL DIVERSITY: CHORDATA PART-II Code: ZOL4B04T  
[TAXONOMY, DIVERSITY, STRUCTURAL ANATOMY AND ADAPTATIONS OF CHORDATES – AVES AND MAMMALS]

#### **Course Outcome Statements**

- CO1 Describe the classification of class Aves down to orders, salient features of each order with suitable examples.
- CO2 Describe the external characters and functional systems of Columba livia.
- CO3 Enumerate the salient features and classification of class Mammalia down to orders with suitable examples.
- CO4 Elucidate the external characters and functional systems of Oryctolagus cuniculus.
- CO5 Compare the circulatory, excretory and nervous systems of vertebrates.

## **B. Sc. ZOOLOGY PROGRAMME PRACTICAL**

ZOOLOGY [CORE COURSE] PRACTICAL – I: ANIMAL DIVERSITY Code: ZOL4B05P [Practical I\*A+ I\*B+ I\*C+ I\*D]

### **Course Outcome Statements**

- CO1 Identify and describe specified protists and acoelomate & pseudocoelomate nonchordates and perform the culture of selected protists; understand the histological features of coelenterate, platyhelminth and nematode.
- CO2 Identify and describe specified coelomate non-chordates and the transverse sections of annelids; Perform mounting of the specified organs of selected nonchordates.
- CO3 Identify and describe specified chordates and specified bones of chordates; Prepare key for identification of venomous snakes; Perform mounting and dissection of specified organ systems of chordates.
- CO4 Identify and describe selected vertebrates and specified bones of vertebrates.

## **FIFTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- V [Theory] CELL BIOLOGY AND GENETICS Code: ZOL5B06T

### **Course outcome Statements**

- CO1 Understand the principles and applications of various types of light microscopes, electron, Scanning-tunnelling and Atomic force microscope and illustrate the histological and histochemical processing of tissues.
- CO2 Explain the basic structure of a eukaryotic cell and the structure and functions of plasma membrane, mitochondria, lysosome, cytoskeletal elements and interphase nucleus.
- CO3 Illustrate the nucleosome organization of chromatin and higher order structures; structure of chromosomes and giant chromosomes.
- CO4 Enumerate eukaryotic cell cycle and cell division by amitosis, mitosis and meiosis.
- CO5 Explain the causes of transformation, characteristics of transformed cells and the role of protooncogenes and tumor suppressor genes in malignant transformation; mechanism and significance of apoptosis.
- CO6 Enumerate allelic and non-allelic gene interactions; supplementary, complementary, polymeric, duplicate and modifying genes and polygenic inheritance.
- CO7 Illustrate multiple allelism and solve problems related to blood group inheritance.
- CO8 Explain characteristics of linkage groups and linkage map; crossing over and calculation of recombination frequency; sex-linked, sex-influenced and sex-limited characters; sex differentiation and disorders of sexual development.
- CO9 Describe the mechanisms of sex determination including chromosomal, genic, haploid-diploid mechanisms; the hormonal and environmental influence on sex determination and gynandromorphism.
- CO10 Explain mutagenesis, mutagens and chromosomal and gene mutations.

- C011 Enumerate the classification and grouping of human chromosomes; numerical and mutational human autosomal and sex chromosomal anomalies; polygenic human traits and genetic counseling.

### **FIFTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- VI [Theory] BIOTECHNOLOGY, MICROBIOLOGY AND IMMUNOLOGY Code: ZOL5B07T

#### **Course Outcome statements**

- C01 Illustrate the steps in genetic engineering and animal cell culture.
- C02 Explain transfection methods, transgenic animals and ethical issues of transgenic animals.
- C03 Enumerate the applications of biotechnology.
- C04 Understand the biological diversity of microbial forms and the various techniques for handling microbes in the laboratory.
- C05 Enumerate the basic structure and life cycle of bacteria and virus.
- C06 Understand the industrial and medical importance of microorganisms.
- C07 Describe different types of immunity and the cells and organs of the immune system.
- C08 Explain antigen, antibody, immunity and major histocompatibility complex.
- C09 Enumerate autoimmune and immunodeficiency diseases and immunology of tumor and organ transplantation.

### **FIFTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- VII [Theory] BIOCHEMISTRY AND MOLECULAR BIOLOGY Code: ZOL5B08T

#### **Course Outcome statements**

- C01 Understand the elements of biological importance and the non-covalent interactions that stabilize biomolecules.
- C02 Describe the classification, types, structure, reactions and biological roles of carbohydrates, and diabetes Type I and II.
- C03 Enumerate the properties and classification of amino acids and their standard abbreviations; hierarchical levels of protein structure, classification, separation, purification and sequencing of proteins.
- C04 Explain the classification and functions of lipids and fatty acids; chemistry and structure of nucleic acids and sequencing of DNA.
- C05 Understand the classification, nomenclature and properties of enzymes; enzyme action, co-enzymes, cofactors, isozymes, ribozymes and allosteric enzymes.
- C06 Explain glycolysis, Krebs' cycle, glycogenesis, glycogenolysis, gluconeogenesis, HMP pathway; amino acid and fatty acid oxidation and oxidative phosphorylation.
- C07 Describe the mechanism of DNA duplication and the role of enzymes.
- C08 Understand the concept of gene and gene expression; genetic code and wobble hypothesis.

- CO9 Explain the mechanism of transcription and post-transcriptional modification of hnRNA.
- CO10 Enumerate the processes of translation and post-translational modification and targeting of peptides.
- CO11 Describe the regulation of trp operon, C-value, repetitive DNA, satellite DNA, selfish DNA, overlapping genes, pseudogenes, cryptic genes, transposons and retrotransposons.
- CO12 Explain the structure and life cycle of bacteriophages and the gene transfer mechanisms in bacteria.

### **FIFTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE- VIII [Theory] METHODOLOGY IN SCIENCE, BIOSTATISTICS AND BIOINFORMATICS Code: ZOL5B09T

#### **Course Outcome Statements**

- CO1 Explain science, its importance, disciplines and the major steps in formulating a hypothesis, various hypothesis models, theory, law and importance of animal models, simulations and virtual testing.
- CO2 Illustrate the principles and procedures in designing experiments and elaborate the requirements for carrying out experiments.
- CO3 Describe the ethical concerns in practicing science.
- CO4 Understand the Scope and role of statistics; methods and procedures of sampling; Construction of tables, charts and graphs.
- CO5 Calculate central tendency and measures of dispersion and application of its knowledge on hypothesis testing as well as in problem solving.
- CO6 Enumerate major biological databases and database search engines.
- CO7 Perform DNA and protein sequence analysis, including sequence alignment and sequence similarity search using BLAST, FASTA, CLUSTAL W and CLUSTAL X.
- CO8 Understand molecular phylogenetics and tools and methods for construction of phylogenetic trees.
- CO9 Explain genome sequencing technologies, functional genomics, proteomic technologies and molecular docking and drug design.

### **B. Sc. ZOOLOGY PROGRAMME PRACTICAL**

ZOOLOGY [CORE COURSE] PRACTICAL – II Code: ZOL6B15P [Practical II\*A + Practical II\*B]

PRACTICAL II\*A: CELL BIOLOGY, GENETICS, BIOTECHNOLOGY, MICROBIOLOGY AND IMMUNOLOGY  
PRACTICAL II\*B: BIOCHEMISTRY, MOLECULAR BIOLOGY, METHODOLOGY IN SCIENCE, BIOSTATISTICS & BIOINFORMATICS

#### **Course Outcome Statements**

- CO1 Perform experiments in cell biology and genetics including demonstration of Barr body in buccal epithelial cells of man, polytene chromosome in the salivary glands of D. melanogaster larva, mitotic division in onion root tip cells, micrometry of microscopic

objects, prepare whole mounts of microscopic objects, and calculate mitotic and metaphase index from slides.

- CO2 Enumerate the inheritance of major human genetic traits, pedigree chart, normal and abnormal human karyotypes, phenotypic differences of male and female Drosophila and solve problems on Monohybrid, dihybrid crosses, blood groups and sex-linked inheritance.
- CO3 Understand electrophoresis, PCR, Northern blotting, Southern blotting and Western blotting, DNA sequencing and fingerprinting and isolation of genomic DNA.
- CO4 Perform gram staining and preparation of culture media for bacteria and demonstrate bacterial motility by standard laboratory protocols.
- CO5 Understand the detection of human blood groups and organs of immune system
- CO6 Perform standard biochemical tests for the detection of reducing and nonreducing sugars, polysaccharides, proteins and lipids.
- CO7 Understand the staining of mitochondria, tissue homogenization and isolation of nuclei, effect of colchicines on cell division, extraction of DNA and polyacrylamide and agarose gel electrophoresis.
- CO8 Solve basic problems in biostatistics and Bioinformatics.

#### **FIFTH SEMESTER B. Sc. ZOOLOGY PROGRAMME**

ZOOLOGY OPEN COURSE- I (Theory) REPRODUCTIVE HEALTH AND SEX EDUCATION Code: ZOL5D01T

##### Course Outcome Statements

- CO1 Understand the reproductive health, and importance of sex education for teen and youth.
- CO2 Explain the chromosomal mechanism of sex determination and sex chromosomal anomalies.
- CO3 Describe the structural and functional features of human reproductive system, fertilization, implantation, pregnancy, gestation, placenta, parturition and lactation.
- CO4 Explain the scope of reproductive technologies in infertility management and the assisted reproductive techniques.
- CO5 Understand the different methods of prenatal diagnosis and associated ethical issues.
- CO6 Describe the different methods of fertility control.
- CO7 Understand the symptoms, mode of transmission, diagnosis and treatment of different sexually transmitted diseases and their socio economic dimensions.
- CO8 Describe sexual orientation, sexual abuse and myths.
- CO9 Understand the ethical aspects of sex.

#### **SIXTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE – IX [Theory] PHYSIOLOGY AND ENDOCRINOLOGY Code: ZOL6B10T

##### Course Outcomes Statements

- CO1 Describe the regulation of digestion in man, nutrition in pregnancy and infancy, nutritional disorders, balanced diet, starvation, fasting and obesity.

- CO2 Understand the mechanism of transport and exchange of respiratory gases and its neurophysiological control and physiological problems in diving mammals, new-born and aged individuals.
- CO3 Describe functions, composition, coagulation, transfusion, agglutination and clinical analysis of blood, haemoglobinopathies, types of heart and common cardio-vascular problems.
- CO4 Understand the osmoregulatory mechanisms in animals; excretion and its hormonal control and common renal disorders in man.
- CO5 Explain the ultrastructure of skeletal muscles and biochemical events and energetics of muscle contraction.
- CO6 Understand the different types of nerve cells, glial cells and nerve fibres, and the mechanism of nerve impulse transmission
- CO7 Understand the types, physiology and significance of bioluminescence, and the structure and functions of electric organs.
- CO8 Describe invertebrate neuro-endocrine organs and hormones, vertebrate endocrine glands, their hormones and functions.
- CO9 Understand the concept of neurosecretion and the mode of action of peptide and steroid hormones.

#### **SIXTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE – X [Theory] REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY Code: ZOL6B11T

#### **Course Outcome statements**

- CO1 Explain the reproductive strategies in invertebrates and vertebrates and structural and functional features of human reproductive system.
- CO2 Describe process of fertilization, pregnancy, gestation, placentation, parturition and lactation in humans.
- CO3 Explain the scope of reproductive technologies in infertility management; prenatal diagnostic techniques and methods of fertility control.
- CO4 Understand the phases and theories of development, and classification of eggs.
- CO5 Enumerate the types of cleavage, arrangement of blastomeres, germ layers and their derivatives, cell lineage in Planocera and different types of blastula.
- CO6 Illustrate the early developmental process of egg in Amphioxus, frog, chick and man.
- CO7 Explain the basics of cell differentiation and its genetic control, stem cells and applications of stem cell technology.
- CO8 Describe parthenogenesis, types, and significance.
- CO9 Explain fate map construction, Spemann's constriction experiments on amphibian embryos, organizers in development, embryonic induction, gradient experiments in sea urchin eggs, cloning experiments in sheep and teratogenesis.

#### **SIXTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE –XI [Theory] ENVIRONMENTAL AND CONSERVATION BIOLOGY Code: ZOL6B12T

Course outcome statements

- CO1 Explain the structure of ecosystem and its functioning through energy flow and nutrient cycling.
- CO2 Enumerate biogeochemical cycles and understand the concept of limiting factors.
- CO3 Describe the ecology of population, community and habitat as a self regulating system.
- CO4 Understand various types of population interactions and appraise the co-evolution.
- CO5 Comprehend the diverse environmental and sustainability challenges ranging from local to global and the establishment of perfect harmony between economic development, social issues and environmental conservation.
- CO6 Enumerate the several tools and techniques employed for studies on populations, communities and ecosystems.
- CO7 Understand the threats to biodiversity, and strategies adapted for the conservation of diversity of organisms.
- CO8 Describe the various international strategies for conserving biodiversity.
- CO9 Describe the toxic chemicals, their toxicity levels and the health hazards caused by them.

**SIXTH SEMESTER B.Sc. ZOOLOGY PROGRAMME**

ZOOLOGY CORE COURSE –XII [Theory] ETHOLOGY, EVOLUTION AND ZOOGEOGRAPHY Code: ZOL6B13T

Course Outcome Statements

- CO1 Describe the patterns and mechanisms of animal behaviour.
- CO2 Illustrate biological rhythms and the chemical basis of communication.
- CO3 Identify major evolutionary transitions over time, and explain the tools and evidences that support current hypotheses of the history of life on earth.
- CO4 Describe the evidences for evolution and its required corollaries.
- CO5 Explain the various theories of evolution.
- CO6 Describe the mechanisms by which evolution occurs.
- CO7 Recognize the significance of reproductive isolation in reducing gene flow between populations, biological and morphological species concepts and distinguish between prezygotic and postzygotic barriers to reproduction.
- CO8 Review the events in human evolution.
- CO9 Explain ecological and historical foundations for understanding the distribution and abundance of species, and their changes over time and comprehend the basic principles of biogeography as a discipline.

**SIXTH SEMESTER B. Sc. ZOOLOGY PROGRAMME**

ZOOLOGY ELECTIVE CORE COURSE- III (Theory) APPLIED ENTOMOLOGY Code: ZOL6B14(E)03T

Course Outcome Statements

- CO1 Describe the branches of entomology and insect services.
- CO2 Identify and explain the lifecycle, damages and control of insect pests of crop plants and domestic animals.
- CO3 Review the insect control strategies.
- CO4 List and describe the useful insects and the products derived from bees, silkworms and lac insects.

### **B. Sc. ZOOLOGY PROGRAMME PRACTICAL**

ZOOLOGY [CORE COURSE] PRACTICAL – III Cod: ZOL6B16P [Practical III\*A + Practical III\*B]

PRACTICAL III\*A: PHYSIOLOGY, ENDOCRINOLOGY, REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

PRACTICAL III\*B: ENVIRONMENTAL AND CONSERVATION BIOLOGY, ETHOLOGY, EVOLUTION, ZOOGEOGRAPHY & ELECTIVE COURSE

#### **Course Outcome Statements**

- CO1 Perform standard laboratory experiments for the estimation of Hb, presence of hCG/abnormal constituents in urine, detection of blood pressure, bleeding and clotting time and identification of formed elements in blood.
- CO2 Identify selected stages in the development of frog and chick and chosen larval forms of invertebrates and vertebrates.
- CO3 Carry out experiments of laboratory standards to estimate water quality parameters including, dissolved Oxygen, Carbon dioxide, hardness and pH; determination of adulteration of selected food items and identify marine planktons and soil organisms.
- CO4 Demonstrate the behavioural response of earthworm/dipteran larva to selected stimuli
- CO5 Describe homologous, analogous and vestigial organs, connecting links, adaptive radiation and evolution of man.
- CO6 Illustrate zoogeographical realms, Wallace line, Weber line, Wallacea and the distribution of Peripatus, lung fishes, Sphenodon, monotremes and marsupials.
- CO7 Identify the normal and selected abnormal human karyotypes and inheritance of chosen traits from pedigree charts/describe ornamental and other culture fishes/ describe chosen beneficial and harmful insects.

### **FIRST SEMESTER B.Sc. ZOOLOGY COMPLEMENTARY COURSE**

Theory Course- I ANIMAL DIVERSITY AND WILDLIFE CONSERVATION Code: ZOL1C01T

#### **Course Outcome Statements**

- CO1 Describe the general characters of protists and salient features of phylum – Rhizopoda, Ciliophora, Dinoflagellata and Apicomplexa.
- CO2 Enumerate the salient features and examples of Phylum – Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Onychophora, Mollusca and Echinodermata, and the structural organization of Peneaus sp.

- CO3 Describe the characteristic features and classification of phylum Chordata with examples and, structural organization of *Oryctolagus cuniculus*.
- CO4 Explain levels of biodiversity, threats to biodiversity, biodiversity hotspots, importance and strategies for conservation of wildlife and sustainable development.

### **SECOND SEMESTER B.Sc. ZOOLOGY COMPLEMENTARY COURSE**

Theory Course- II ECONOMIC ZOOLOGY Code: ZOL2C02T

#### **Course Outcome Statements**

- CO1 Explain parasitism and the major protist, cestode, trematode and nematode parasites of man and major insect vectors of human diseases and their control.
- CO2 Understand major beneficial and harmful insects, damages caused to host plants and their control measures.
- CO3 Understand pisciculture, prawn, mussel and pearl culture.

### **THIRD SEMESTER B.Sc. ZOOLOGY COMPLEMENTARY COURSE**

Theory Course- III PHYSIOLOGY AND ETHOLOGY Code: ZOL3C03T

#### **Course Outcome Statements**

- CO1 Describe the structure of plasma membrane and the various trans-membrane transport mechanisms.
- CO2 Enumerate the constituents of normal diet and the mechanism of digestion and absorption of carbohydrates, proteins and lipids and the regulation of gastrointestinal function.
- CO3 Explain the mechanism of transport of respiratory gases, control of respiration, respiratory problems and artificial ventilation.
- CO4 Explain the structure and working of human heart and mechanism of regulation of heart beat; constituents of human blood and blood transfusion and cardiovascular problems.
- CO5 Illustrate the structure of human kidney, the mechanism of urine formation, hormonal control of kidney function and kidney disorders; osmoregulation and urea cycle.
- CO6 Enumerate the structure of myofibrils and myofilaments; muscle contractile and regulatory proteins and mechanism of muscle contraction.
- CO7 Explain different types of nerve cells and glial cells, maintenance of resting membrane potential, generation and propagation of action potential and synaptic transmission.
- CO8 Describe innate behavior, learned behavior, patterns of behavior and factors that affect behavior.
- CO9 Enumerate biological rhythms, communication in animals and social organization in mammals.

### **FOURTH SEMESTER B.Sc. ZOOLOGY COMPLEMENTARY COURSE**

Theory Course- IV GENETICS AND IMMUNOLOGY Code: ZOL4C04T

#### **Course Outcome statements**

- CO1 Describe human karyotype , chromosomal anomalies and polygenic inheritance.
- CO2 Explain the mechanisms of sex determination.
- CO3 Enumerate the concept of genes, gene expression, genetic code, transcription and translation.
- CO4 Illustrate the mechanism of recombinant DNA technology and its practical applications.
- CO5 Explain the types of cancer, causes of transformation and characteristics of transformed cells.
- CO6 Identify the cells and organs of immune system, antigens and antibodies.
- CO7 Enumerate antigen-antibody interaction, generation of B-cell and T-cell response and major immunotechniques.
- CO8 Explain primary and secondary immunodeficiency diseases, autoimmune diseases, vaccination and vaccines.

### **B.Sc. ZOOLOGY COMPLEMENTARY COURSE**

PRACTICAL Code: ZOL4C05P [Practical I\*A+I\*B+I\*C+I\*D]

#### **Course Outcome statement**

- CO1 Identify the salient features of the phylum; taxonomic position, habit, habitat, adaptations/importance of selected protists, non-chordates and chordates.
- CO2 Describe major human parasites and economically important insects, molluscs and fishes.
- CO3 Perform detection of human blood groups and prepare human blood smear as per laboratory standards; mounting of specialized organs of selected nonchordates and chordates, and demonstrate the presence of biomolecules in samples by standard laboratory protocols.
- CO4 Illustrate the normal and selected abnormal human karyotypes and mode of inheritance of selected human genetic disorders and perform the dissection of earthworm and sardine to demonstrate the alimentary canal and Penaeus to demonstrate the nervous system.

<b>AUDIT COURSE</b>			
<i>Course Code</i>	<i>Title of the Course</i>	<i>Course Outcomes</i>	<i>Semester</i>
ZOLAUD01	Environment Studies	<ul style="list-style-type: none"> <li>▪ To acquaint the students with various environmental issues</li> <li>▪ To orient the students towards environmentally friendly approach</li> <li>▪ To work for the conservation of nature</li> </ul>	1
ZOLAUD02	Disaster Management	<ul style="list-style-type: none"> <li>▪ To acquaint the students with various aspects of Disaster Management</li> <li>▪ To orient the students towards disaster management</li> </ul>	2

ZOLAUD03	Human Rights	▪ To acquaint the students with basic aspects of Human rights	3
ZOLAUD04	Gender Studies	▪ To enable students to identify concepts of class, race and gender as social constructs	4