DEPARTMENT OF ZOOLOGY

PROGRAM SPECIFIC OUTCOME (PSO) OF ZOOLOGY:

- Demonstrate a comprehensive understanding of the principles and concepts relating to zoology.
- Apply knowledge of zoology to identify and classify diverse animal species
- Students can acquire knowledge regarding the evolution, anatomy, morphology, systematics, genetics, physiology, developmental biology, micro technique, ecology, and conservation of animals.
- Students remained informed about the ecological and evolutionary features of the fauna.
- Understand the impact of environmental factors on animal populations and ecosystems.
- To develop interest in nature and living forms and their conservation.
- To study and to create awareness about different ecological sites for animals in their natural habitats by field study.
- To provide opportunities for the application and training of the acquired knowledge in day- to -daylife.
- Communicate scientific findings effectively through oral presentations and written reports
- To expose students to various fields in biological sciences and to develop interest in related disciplines.
- To attain an interdisciplinary approach to understand the application in life-Science
- To familiarize the emerging new areas of Zoology and their applications in various spheres of biological sciences and to the students of its relevance in future studies.
- Use appropriate laboratory techniques and instrumentation for studying and analyzing animal specimens.
- Stay updated on current research and advancements in the field of zoology.

BSC ZOOLOGY

COURSE SPECIFIC OUTCOME:

BSC I			
SEMESTER I			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT01	I	Animal Diversity of Nonchordates (Protozoa to Annelida)	**1.** Describe general taxonomic rules on animal classification. **2.** Classify Protozoa up to phylum using Examples from parasitic adaptation. **3.** Describe different mode of adaptation in Protozoa through locomotion, nutrition andreproduction. **4.** Classify Phylum Porifera with taxonomic keys. **5.** Describe morphology, anatomy and histology of Porifera. **6.**Classify Phylum Cnidaria with taxonomic keys. **7.** Describe Phylum Cnidaria with Structure, life cycle, Polymorphism, Alternation of generation, Locomotion, Nutrition, Nematocyst, Coral reef. **8.** Classify Phylum Platyhelminthesto Annelida with taxonomic keys. **9.** Describe Phylum Platyhelminthes to Annelida with Structure and Life history and various modes of adaptations.
USCZOT02	II	Cell Biology	**1:** Explain ultra-structure of Prokaryotic and Eukaryotic cell. **2:** Explain Structure of Fluid mosaic model of plasma membrane and its functions. **3:** Explain structure and functions of nucleolus and nuclear membrane **4 :**Describe the Structure, types of chromosome and structure of nucleosome,Lamp-brush and polytene chromosome **5:** Explain ultra-structure of mitochondria and

			oxidative phosphorylation,Electron transport chain and terminal oxidation **6:** Describe ultra-structure and function of Endoplasmic reticulum and Golgiapparatus. **7:** Describe Ultra-structure of Golgi Complex. **8:**Describe Structure, polymorphism and functions of Lysosomes. **9:** Explain structure, types of Ribosome andLake's model. **10:** Describe the Cell cycle, Mitosis, Meiosis and synaptonemal complex.
USCZOP01	PRACTICAL	CORE COURSE I & IIPRACTICALS BASEDON PAPER I ANDPAPER II	**1.** Study of Animal Specimen upto classes from Phylum Protozoa to Annelida. 2. Study of Slides to understand the structure, histology of Phylum Protozoa to Annelida. 3. Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs etc. 4. Study of Structure, Functions of Compound and Dissecting microscope and uses. 5. Study of Effect of Osmosis on eukaryotic cell through RBC. 6. Demonstration of mitotic cell division, polytene chromosome in dipteran larvae, mitochondria in buccal epithelium. 7. Use of ocular micrometer and measurement of micro objects.
SEMESTER II			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT03	III	Animal Diversity of Nonchordates (Arthropoda to Hemichordata)	1. Describe general taxonomic rules onanimal classification 2.Classify Arthropoda up to phylum Hemichordata using examples and adaptation. 3. Classify Phylum Arthropoda toHemichordata with taxonomic keys. **4:** Describe External Morphology, Digestive

			system, Circulatory system, Nervous system, Reproductive system and Sense organs of Arthropoda, Mollusca, Echinonodermata and Hemichordata **5:** Pearl formation, Bipinnaria and Brachiolaria larva, Regeneration and Autotomy inEchinoderm and Affinities of Balanoglossus
USCZOT04	IV	Genetics & Evolution	**1:** Introduction to Genetics**,** Mendel's work on transmission of traits, Laws of Genetics **2:** Interaction of genes**,** Sex linked inheritance,extra-chromosomal inheritance **3:** Linkage, Crossing Over, Syndrome and Mutation **4:** Major Events in History of Life - Urey-Miller Experiment, Oparin theory **5:** Introduction to EvolutionaryTheories :Lamarckism, Darwinism, Neo-Darwinism **6:** Describe Types of fossils and Evolution ofhorse **7:**Processes of Evolutionary Change,Micro,Macro and Mega-evolution **8:** Mass extinction:Causes, and Role ofextinction in evolution.
USCZOP02	PRACTICAL	CORE COURSE III & IV PRACTICALS BASED ON PAPER III AND PAPER IV	1. Observation, classification (uptoclasses) and sketching of the following animals through specimen/model of phylum Arthropoda to Hemichordata. 2. Study of Slides to understand the structure, histology of Phylum Arthropoda to Hemichordata. 3. Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs. 4. Identification of wild and mutant type Drosophila. 5. Demonstration of monohybrid, Dihybrid crosses by colour beads. 6. Study of sickle cell anemia, Thalassemia,

			ABO and Rh blood groups, Drum stick in the human blood, Barr body in vaginal smear or buccal epithelium. 7. Study of human genetic trait by using Hardy-Weinberg equations- Rolling of tongue, baldness, widow peak, length of index and ring finger, attached and free ear lobe. 8. Study of pictures of human chromosome abnormalities, Adaptive radiations in Reptilia and Mammals, Parallel, Convergent and Divergent evolution, Stabilizing, Directional and Disruptional evolution. 9. Preparation of models on genetics.

BSC II			
SEMESTER III			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT05	V	Animal Diversity (Chordates) And Comparative Anatomy	**1:** General characters and Classification up to order; Urochordata, Cephoalochordata,Cyclostomata, Pisces, Amphibia, Reptilia, Aves, Mammals **2:** Explain external morphology and digestive system Urochordata, Cephoalochordata,Cyclostomata. **3:** Describe **o**smoregulation in Fishes, Accessory respiratory organs. **4:** Write Parental care and Neoteny of Amphibia **5:** Study of Snake venom, Poison apparatus & biting mechanism, Poisonous and nonpoisonous snake **6:** Write Flight adaptations, Birds migration and its significance **7:** Describe Comparative account of derivatives of integuments and aortic arches, Heartand urinogenital system.
USCZOT06	VI	Physiology &	1. Seeks to understand the mechanisms

		Biochemistry - I	that work to keep the human body alive andfunctioning 2. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and bio chemicalfunctions of humans, their organs, and the cells of which they are composed. 3. Interactions and interdependence of physiological and biochemical processes. **4:** Describe Metabolism of Carbohydrates, Protein and Lipid. **5:** Explain General properties, Classification, Distribution and chemical nature ofEnzyme. **6:** Describe the Structure and functions of digestive glands **7:** Study of Gastro-intestinal hormones and Vitamins. **8:** Explain Digestion and absorption of proteins, carbohydrates and lipids. **9:** Describe the Mechanism of Respiration, Transport of O2 and CO2. **10:** Describe the Respiratory pigments and effects of smoking.
USCZOP03	PRACTICAL	CORE COURSE V & VI	1. Identification and Classification ofmuseum specimens from Urochordata toMammals. 2. Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs etc. (Any locally available fish). 3. Study of skeleton of Rabbit or Fowl and permanent slides.

			4. Study of histological slides of Mammal– Duodenum, Liver, Lung, Bone and Cartilage. 5. Demonstration of carbohydrates, proteins and lipids by histochemical methods CO6. Estimation of total protein in given solution by Lowry's method 7. Study of activity of salivary amylase under optimal condition. 8. Qualitative test to identify functional group carbohydrate in given solution (glucose, fructose, sucrose, lactose).
SEMESTER IV			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT07	VII	Developmental Biology	**1:** Describe Classification on the basis of amount and distribution of yolk. Chemical composition of yolk. **2:** Explain **m**echanism and significance of Fertilization. **3:** Describe the Types of cleavages and blastulation process. **4:** Study of Morphogenetic movements inthe early development of Frog. **5:** Explain Development of Chick up to the formation of primitive streak and extra embryonic membranes. **6:** Describe the Gametogenesis, Structureof a Sperm and Ovum. **7:** Describe Implantation and Placentation. **8:** Describe Mechanism and significance of Apoptosis **9:** Explain In Vitro fertilization, Semen bank, Artificial inseminations andContraceptives. **10:** Gains knowledge about

			gametogenesis,cleavage mechanisms, gastrulation and roleof hormones in metamorphosis andregeneration.
USCZOT08	VIII	Physiology & Biochemistry - II	**1:** Describe Structure of Uriniferous tubule and Mechanism of urine formation. **2:** Explain Normal and abnormal constituents of urine. Elementary idea of dialysis. **3:** Describe the Structure and functions of pituitary gland, thyroid and adrenal gland. **4:** Study of Oestrous and menstrual cycle, Male and female sex hormones. **5:** Explain Types of neurons, E.M. structure of neuron 3 **6:** Describe the Ultra-structure and Properties muscle **7:** Describe Composition and functions of blood, Blood clotting, Cardiac cycle, E.C.G.and Blood pressure. **8:** Seeks to understand the mechanisms thatwork to keep the human body alive andfunctioning. **9:** Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of humans, their organs, and the cells of which they are composed. **10:** Interactions and interdependence ofphysiological and biochemical processes.
USCZOP04	PRACTICAL	Core Course VII& VIII	**1:** Study of T.S. of Tadpole through internal and external gills, V.S. of Blastula, Gastrula and Neurula, Chick embryology : Whole mount of 18 hrs, 24 hrs, 30 hrs, 36 hrs and 72 hrs. **2:** Detection of urea, albumin, sugar and

			creatin in urine **3:** Sperm count of any domestic animal. **4:** Study of histological slides of Mammal– T.S. of Kidney, Pituitary, Thyroid and Adrenal glands, Testis, Ovary, Uterus, Placenta, Medulated and Non medulated nerve fibres, Smooth and Striated muscle, Spinal cord. **5:** Preparation of haemin and haemochromogen crystal **6:** Quantitative estimation of amino acids using ninhydrin reaction **7:** Estimation of glycin by Sorensonformal titration **8:** Examination of gametes of Frog –Sperm and Ova through permanent slide or microphotograph.
BSC III			
SEMESTER V			
DISCIPLINE SPECIFIC ELECTIVES (DSE) (ANY TWO)			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT09	IX	Parasitology	**1:** Study of introduction and history of Parasitology and Host Parasite Relationship. **2:** Explain Modes of Infection Structure, Life Cycle, Pathogenicity and treatment ofParasitic Protozoan **3:** Describe the Structure, Life Cycle, Pathogenicity and Treatment of helminthesParasites and Nematode parasites **4:** Study ultrastructure of body wall of parasite, Respiration and excretion of helminthes **5:** Explain Parasitic adaptations, Morphology of Arthropod parasite and Causes andtreatment of Arthropod parasite. **6:** Describe Structure, Pathogenicity and treatment of bacterial and fungal diseases

			inFishes. **7:** Describe Pathogenicity and treatmentof (Typhoid, T.B). **8:** Describe Zoonotic diseases and pathogenicity (Swine flu, Bird Flu). **9:** Explain Study of Vectors as disease transmitters (Flea, TseTse fly).
USCZOT10	X	Applied Zoology	1: Students will applications of Zoology in Agriculture and other industries. 2: Identify various methodology and perspectives of applied branches of zoology for the possibilities of self- employment. 3: Learn the basic principles involved in theculture and breeding of commonedible and ornamental fishes of Kerala andthe art of aquarium keeping. 4: Get a basic understanding of humangenomics and reproductive biology. 5: Aware about stem cell research and prenataldiagnostic techniques.
USCZOT11	XI	Insect Vector AndDiseases	**1:** Describe **g**eneral Features of Insects **2:** Explain **t**ypes of Mouth parts and antennae. **3:** Describe the mechanical and biological vector. **4:** Study Host-vector relationship, Adaptations as vectors. **5:** Explain Classification of insects up to orders, detailed features of orders with insects asa Vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera **6:** Describe dipterans as important insect vectors – Mosquitoes, Houseflies; **7:** Study of mosquito-borne diseases – Chickungunya, Filariasis **8:** Describe Breeding and control of

			mosquitoes **9:** Study of sand fly-borne diseases and house fly as important mechanical vector. **10:** Describe Bugs as insect vectors;Blood-sucking bugs; Chagas disease. **11:** Explain Fleas as important insectvectors and Host-specificity, **12:** Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas. **13:** Study Human louse (Head, Body and Pubic louse) as important insect vectors. **14:** Explain Relapsing fever, Trench fever, Control of human louse.
USCZOT12	XII	Aquatic Biology	1: Course provides them comprehensive understanding about aquatic ecosystem and various economical important fishes. 2: Students gain knowledge in the areas of responses characterization and classificationof Ostracoderms, placoderms, acanthodians,holocephali, elasmobranchs. 3: Students will get information aboutzooplanktons, rotifers and other Microscopic organisms.
USCZOP05 USCZOP06 USCZOP07 USCZOP08	Practicals	Core Course Any Two Form Core Paper IX, X, XI, XII	Practicals on Any Two Form Core Paper IX, X, XI, XII
SKILL ENHANCEMENT COURSES (SEC) (ANY ONE)			
		Apiculture	**1:** Describe history of bee keeping: Definition, Bee keeping in worldwide and India **2:** Describe traditional and Modern beekeeping, Urban or backyard beekeeping. **3:** Describe types of honey bees, Lifecycle – Queen, Drone, Worker **4:** Explain basic requirements of Tools

			for starting bee keeping. **5:** Describe bee keeping equipment - introduction to types of bee boxes. **6:** Explain economic importance of honey and processing of honey.
		Sericulture	1: Gives knowledge of silk worm rearing. 2: Mulberry cultivation 3: Pests and diseases associated with silk wormand mulberry. 4: Various process involved in silk production.
BSC III			
SEMESTER VI			
DISCIPLINE SPECIFIC ELECTIVES (DSE) (ANY TWO)			
Paper Code	**Core Paper**	**Title of the Paper**	**Course Outcome**
USCZOT13	XIII	Immunology	**1:** Describe the historical Perspective and basic concepts in immunology of Immunology **2:** Explain Innate Immunity and Adaptive immunity. **3:** Describe the Haematopoeisis, Primary and Secondary lymphoid organs. **4:** Study basic properties of antigens, Haptens and adjuvants. **5:** Explain structure, classes and functions of antibodies. **6:** Describe B and T cell epitopes and monoclonal antibodies. **7:** Describe Structure and functions of MHC I and II. **8:** Describe **a**utoimmunity - Type I Diabetes mellitus, Psoriasis, Systemic Lupus Erythematosus. **9:** Explain Vaccines: Live, killed, recombinant and toxoid.
USCZOT14	XIV	Animal Biotechnology	1: It gives insight into various cell/tissues

			culture techniques. 2: Understanding of in vitro culturing of organisms and production of trans genic animals. 3: Understanding of cloning of mammals, largescale culture and production from recombinant microorganisms 4: Gains skills in medical, environmental biotechnology, bio pesticides, Biotechnology of aquaculture and use of animals as bioreactors 5: This insight allows students to take into consideration about ethical issues involved in production transgenic animals and BTproducts.
USCZOT15	XV	Microtechnique, Bioinformatics And Biostastistics	1: Students gain knowledge about various tools and techniques used in biological systems and gives them insight about their use in research. 2: Biostatistics teaches them to use the best data analysis methods in their research projects. 3: Students gains knowledge about statistical methods like measures of central tendencies ,Probability. 4: Learns about hypothesis testing andinferential statistics 5: Learns the problem-solving methods.
USCZOT16	XVI	Reproductive Biology	**1:** Describe **r**eproductive System and abnormalities of Human Sex Development. **2:** Hypothalamo – Hypophyseal – Gonadal axis and Gonadal hormones. **3:** Describe Reproductive Endocrine Disorders in Male and Female **4:** Study histology of male and female reproductive system in rat and human **6:** Describe androgen metabolism and

			Biochemistry of Semen. **7:** Describe cryptorchidism and Castration **8:** Describe reproductive cycles in rat and human and their regulation. **9:** Describe mechanism of parturition and its hormonal regulation, Lactation and itsregulation. **10:** Explain Infertility in male and female and assisted Reproductive Technology **11**:Describe modern contraceptivemeasures. **12:** Demographic terminology used in family planning.
USCZOP09 USCZOP10 USCZOP11 USCZOP12	PRACTICAL	Core Course - Any Two Form Core Paper XIII, XIV, XV and XVI	Practical on Any Two Form Core Paper XIII, XIV, XV and XVI.
SKILL ENHANCEMENT COURSES (SEC) (ANY ONE)			
		Medical Diagnostic	1: Gives knowledge related to the techniques involved in detection of various diseases. 2: Pathology associated with various diseases. 3: Practical skills of conducting basic clinical lab experiments 4: Application of knowledge of clinical Science and pathology to one's own life.
		Public Health And Hygiene	1: Realize the factors affecting Health. 2: Apply the knowledge to lead a healthy Lifestyle.