Department of Zoology (Program Outcomes)

Course	Semester	Papers	Programme outcomes
B.Sc. ZOOLOGY DEGREE PROGRAM	First Semester	Lower Non Chordate	Familiar with the lower non-chordate world that surrounds us.
		Higher Non Chordate	Familiar with the higher non-chordate world that surrounds us.
		Cell Biology	To develop deeper understanding of what life is and how it functions at cellular level.
		Practical	Prepared slides are studied to understand and arrangement of different muscular regions. Study of museum specimens to understand the morphology, habit and habitat of non- chordate animals. To familiar with mitosis and meiosis process and to prepare permanent slides using available material.
	Second Semester	Molecular Biology, Elementary Biotechnology and Biological Techniques	To understand the basis of life at molecular level. To understand the applications and to familiar with the tools and techniques of biotechnology.
		Taxonomy, Evolution and Elementary Palaeontology	Students are able to understand the fundamental principles of systematic in which the animals are, how to classify according to their characters and what are the theories which have to followed for classification is studied. To understand the basis of origin of life and experiments for supporting that idea. To know about Darwinism, Lamarkism and modern synthetic theory. To learn about geological time scale and zoogeographical realms and also know about barriers, dispersals and their impact on animal distribution.
		Genetics	To understand basic principles of Mendelian inheritance, cell division and chromosomal structure. To learn the concepts of linkage, crossing over, sex determination, sex linked inheritance etc.
		Practical	To solve numerical problems based on Mendelian inheritance. To know about the principles and mechanism of photometry, chromatography, electrophoresis and radioimmunoassay. To aware about animal collection tools and techniques. To study evolution of man with the help of model. To know the working and application of laminar flow, autoclave, ELISA reader, PCR etc.
B.Sc. ZOOLOGY DEGREE PROGRAM	Third Semester	Lower Chordates	Familiar with the lower chordate world that surrounds us.
		Higher Chordates	Familiar with the higher chordate world that surrounds us.
		Ecology, Environmental Biology	Understanding on the basic theories and principles of ecology. To aware about current environmental issues and human influence on environment. To develop positive attitude towards biodiversity conservation.
		Practical	Prepared slides are studied to understand and arrangement of different muscular regions in various chordates groups. Study of museum specimens to understand the morphology, habit and habitat of chordate animals. Ability to estimate dissolves O_2 and CO_2. To measure pH of different water samples and soil. To estimate the moisture content in soil samples. Study of protected areas.
	Fourth Semester	Developmental Biology	Familiar with various stages involved in the developing embryo and to understand the initial developmental procedures involved in frog, chick and rabbit.

		Applied Zoology	To identify various methodology and perspectives of applied aspects of Zoology for the possibilities of self employment.
		Elementary Entomology and Applied Ichthyology	The students are able to know the basis of insects morphology, anatomy, biology and behaviour of the insects. The students will be able to identify and classify any fish with respect to structure, systematic and ecology.
		Practical	Learn about detailed structures of Chick embryos and Frog. To understand the social life of useful insects like honey bee, silk worm and lac insect. To get familiar with commercially important varieties of poultry and cattle. To acquire knowledge about salient features and outline classification of various fishes.
	Fifth Semester	Microbiology	Familiar with the tools and techniques used in microbiology and pathogenic microbes.
		Animal Behaviour	To understand and identify behaviours in a variety of taxa.
		Toxicology and Histology	To understand the nature of toxic substances and their mechanism of action, their adverse effects on living organisms. To understand about differentiation and organization of cells and maintenance of tissues.
		Practical	To acquire knowledge about the culture of microbes, to prepare liquid and solid media for cultivation of Bactria and fungi and gram staining of Bactria. To understand the different kinds of behaviour with the help of photographs. To learn behavioural responses in fish, insects etc.. against to some toxicants and calculation of Lc_{50} in various available animals. Students acquire detailed information on various tissues and organs systems.
B.Sc. ZOOLOGY DEGREE PROGRAM	**Sixth Semester**	Biological Chemistry and Basic Mammalian Endocrinology	All the biochemical components of the body system are studied. It helps the students to get a view about the chemical compositions of different chemical compounds and also includes the pathway and chemical which are responsible for the energy production in our body. Endocrinology gives an idea about the glands which works inside the body and secrets a chemical (Hormone). How it works and the regulation of these hormones are discussed.
		Animal Physiology	The entire animal's functions of the body are studied in this part. It includes respiration, excretion, digestion, circulation, nerve physiology etc.. in which all structure, function, process and control are to be studied.
		Bioinformatics and Biostatistics	Familiar about the use of computers and different related tools used in various fields of biological sciences. Statistics used in biology. What are the parameters, methods of determination and how it analyzed are to be taught.
		Practical	Students get familiar with preparation of haemin crystals from human blood, counting of RBC and WBC's in human blood, determination of haemoglobin percentage etc.. to acquire knowledge about qualitative identification of carbohydrate, protein and lipids. To get knowledge about

			endocrine glands and related disorders. Students are able to learn how to calculate mean, median, SD, SE and preparation of histogram and pie diagram. To familiar with computer and its application.
M.Sc. ZOOLOGY DEGREE PROGRAM	**First Semester**	Microbiology	To learn classification and importance of microorganism (Bacteria and viruses). To acquire knowledge about kinds of micro organisms, their habitat, morphology and physiology, their culture etc..
		Non-Chordate	To get familiar with the classification, habit and habitats and characters of non-chordate phyla.
		Ecology	Students get knowledge about the environment, its components, relevance to human welfare. To get aware with ecosystem and its structure and function, limiting factors, population ecology, eutrophication and various environmental issues like global warming, climate change, acid rain, green house effects and ozone layer depletion. To develop positive attitude towards biodiversity and its conservation.
		Taxonomy and Evolutionary Biology	Students are able to understand the significance and approaches in taxonomy, Linean hierarchy, taxonomic aids, various species concepts and rules of Zoological nomenclature and preservation and identification of insects. To understand the modern synthetic theory and know about variations, concepts of species and their types, speciation, basic patterns of evolution, mimicry its types and significance.
		Molecular Biology	To understand the basis of life at molecular level, Chemistry of gene, DNA as genetic material, mutation and its types, transcription, translation and nucleic acid sequencing.
		Practical	Students are able to understand permanent preparations of the available material, determination of dissolve oxygen, Fre CO_2, moisture content, total organic matter in soil sample, Salinity and Calorinity in water samples. To get practical knowledge of preparation of culture media for bacteria, staining and isolation of microorganisms. Study of evolution of horse, elephant and man through models or charts, analogy and homology and identification of local fauna.
	Second Semester	Concepts in Cell Biology and Genetics	To develop deeper understanding about the diversity of cell, molecular aspects of cell division, cellular communication and responses to environmental signals in bacteria and animals, biology of cancer, chromosomal analysis and mapping, Mendelian genetics, microbial genetics, concept of gene and about plasmid.
		Mammalian Endocrinology	Endocrinology gives an idea about the glands inside the body and secrets a chemical (Hormone). Mode of secretion, mechanisms of hormonal action, Hypothalamo-hypophysial system, detailed study about endocrinal pancreas, thyroid gland, parathyroid gland, adrenal gland, pineal gland and about reproductive endocrinology.
		Biochemistry	To understand the molecular logic of life, bioenergetics, biomolecules, enzymes and coenzymes. To get detailed knowledge of metabolism of carbohydrate, proteins and lipids, minerals and basic concept of xenobiotic compounds.
		Animal Physiology	The entire animal's functions of the body are studied in this part. It includes nutrition, circulation, respiration, excretion,

			muscle physiology, thermoregulation, nervous coordination and about immune system.
		Practical	Students get practical knowledge of test for carbohydrates, proteins and proteins, determination of haemoglobin parentage in human blood, differential count of leucocytes in human blood, estimation of total erythrocytes in human blood. To study the different stages of mitosis with the help of onion root tip. To stages of different stage of meiosis with the help of grasshopper testis. To prepare models of ATP, DNA and RNA bases, Nucleotides and Nucleosides by using beads and wires. To solve genetical exercise with the help of given data, Morphological study of drosophila. To study endocrine glands of rats and insects through photographs or models.
	Third Semester	Chordates	To familiar with the classification, habit and habitats, characters and origin of chordates.
		Animal Behaviour	To understand and identify behaviours in a variety of taxa, to know various behaviour patterns like FAP, learnt behaviour, memory, social behaviour, communication, individual and migratory behaviour and about biological rhythm.
		Developmental Biology	To understand the mechanism of fertilization, cleavage, blastulation, gastulation and organogenesis. To study about foetal membranes in mammals, organizer concept, regeneration, metamorphosis, teratogenesis and ageing.
		Biotechnology	To understand the applications and to familiar with the tools and techniques of biotechnology, gene therapy and transplantation biology, genetic engineering in animals, social issues of transgenics, ethical issues and bioremediation.
		Bioinstrumentation, Biostatistics and Computational Biology	To acquire knowledge about the principles and techniques of microscopy, centrifugation, pH meter, chromatography, electrophoresis and PCR, Statistics used in biology. What are the parameters, methods of determination and how it analyzed are to be taught. Familiar about the use of computers and different related tools used in various fields of biological sciences.
		Practical	Study of permanent slides and museum specimen of protochordate and chordate. To study development of Frog and Chick through permanent slides, models or charts. To learn about the working and application of instruments like microscopes, microtome, colorimeter, centrifuge etc. To study about the calculation of mean, median, mode, SD and SE from the given data. To study different behaviour patterns through models or charts
	Fourth Semester	**Specialization in Fish and Fisheries**	
		1(a) General Ichthyology	Students are taught about the systematic position, habit and habitat, morphology, distribution, significance of fishes, locomotion in fishes, electric organs, accessory respiratory organ in fishes, hill stream adaptation venous and non-venomous, fish pheromones and parental care in fishes, sense organs, reproduction in major carps and the hormonal functions of the endocrine glands.
		2 (a) Applied Ichthyology	The students are able to know the methods of fishing, fish preservation, transport, marketing, carp culture, integrated aquaculture, larvivorus fishes, fish diseases and their management, exotic fishes, cryopreservation of gametes and embryo and about ornamental fish culture.

		Practical	The students are aware with the osteology of a cyprinoids and siluroid fish, permanent preparation of scales, ampullae, taxonomic studies of fresh water fishes, estimation of DO, CO_2 and pH of pond water, determination of age with the help of scales, analysis of gut content and study of length-weight relationship.
		Specialization in Entomology	
		1 (b) Systematics and Applied Entomology	The students are taught about the classification of insects, methods of collection, preservation and culture of insects, parental care in insects, habit and habitats and general characters of various orders, principles and practises of pest control, about lac industry, apiculture, sericulture and insects of medical importance of man and animals.
		2 (b) Biology of insects (Morphology, Physiology and development)	The students are familiar with the structure and functions of various body parts of insects, flight mechanism, physiology of digestion in different insects, blood circulation, excretion, respiration, nervous system in insects, visual and sound production organs, chemo-receptors, light producing organs with mechanism, different type of pheromones and their chemical nature, male and female reproductive systems in insects, different types of larvae and pupae and about polyembryony and parthenogenesis in insects.
		Practical	The students are able to understand the dissection of nervous systems of insects, permanent preparation of sting apparatus of honey bee or wasp, salivary glands of cockroach, mouth parts of insect, identification of insects, adaptation found in insects, pests of fruits, vegetables and stored grains, study of life cycles of some important pests and exercise on insect behaviour.