Zoology

Programme Specific Outcomes

Programme offered by the Department	Outcomes
B.Sc Honours Programme	On completion of the Programme, the students would be able to: 1. Have the knowledge and skill base that would enable them to undertake further studies in Zoology and related areas or in multidisciplinary areas. 2. To develop a range of generic skills that are relevant to wage employment, self-employment and entrepreneurship. 3. To enhance the skills required to perform research in laboratory and experimental research. 4. Obtain a significant knowledge on fundamental and advanced aspects of classical zoology and other related fields like Biochemistry, Animal Physiology, Genetics, Ecology and Evolution, Entomology, Fishery, etc. 5. Gain proficiency in laboratory techniques, skills and apparatus to obtain reproducible data from biochemical experiments; implement experimental protocols, and adapt them to plan and carry out simple investigations in Biochemistry, Developmental Biology, Applied Zoology. Social Interaction: 6. Students will further achieve skill development in different aspects of applied Zoology like Apiculture, Sericulture, use of biology tools and instruments
B.Sc Programme Course	On completion of the Programme, the students would be able to 1.Obtain a significant knowledge on fundamental and advanced aspects of classical zoology and other related fields like Biochemistry, Animal Physiology, Genetics, Ecology and Evolution, Entomology, Fishery, etc. 2. Gain proficiency in laboratory techniques, skills and apparatus to obtain reproducible data from biochemical experiments; implement experimental protocols, and adapt them to plan and carry out simple investigations in Biochemistry, Developmental Biology, Applied Zoology. Social Interaction: Students will further achieve skill development in different aspects of applied Zoology like Apiculture, Sericulture, use of toolsand Instruments.

ZOOLOGY

Course Outcomes

B.Sc Honours Programme

Semester	Course Code	Course Title	Outcomes
I	CC1	**CC1- Non-Chordates I**	The students will be able to: 1.Understand invertebrates by Identification of characteristic features of each taxon up to class level for non-chordates 2.Learn special features specific to different phyla like locomotion in protest, canal system in Porifera, life history of some platyhelminth and nemathelminth parasites, metamerism in annelids 3. Identify different invertebrate specimens from slides and bottled specimen. 4. Learn how to use a compound microscope
	CC2	**CC2 –Ecology**	1. Know the evolutionary and functional basis of animal ecology. 2. Understand what makes the scientific study of animal ecology a crucial and exciting endeavour. 3. Engage in field-based research activities to understand well the theoretical aspects taught besides learning techniques for gathering data in the field. 4. Analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice. 5. Solve the environmental problems involving interaction of humans and natural systems at local or global level.
II	CC3	**CC 3–Non-Chordates II**	The students will be able to: 1. Understand invertebrates by

			Identification of characteristic features of each taxon up to class level for non-chordates 2. Discuss special features specific to different phyla:Nervous system and torsion and detorsion in Gastropoda,Respiration in Arthropoda, Water vascular system in Echinodermata etc. 3. Identify different invertebrate specimens from slides and bottled specimen. 4. Learn dissection of an insect.
	CC4	**CC 4 - Cell Biology**	Students will 1.Gain understanding on the details of the basic unit of life at the molecular level. 2. Understand the fine structure and functions of cell organelles. 3.Understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved. 2. Acquire the detailed knowledge of different pathways related to cell signaling and apoptosis thus enabling them to understand the anomalies in cancer. 3. Develop an understanding how cells work in healthy and diseased states .
III	CC5	**CC 5 – Chordates**	The students will be able to: 1.Gain conceptual knowledge of vertebrates, their adaptations and associations in relation to their Environment 2.Discuss special features specific to different groups like flight in birds, parental care in amphibians,echolocation in cetaceans etc. 3.Classify Protochordates to class Mammalia

			4.Aquire basic dissection skills of vertebrates 5. Identify different vertebrate specimens
	CC6	**CC 6 - Animal Physiology**	The student will be able to: 1.Gaining knowledge about the basic Control and coordination Systems: Nervous system, muscular, skeletal, endocrine and reproductive systems 2.Identify permanent Mammalian Histological sections 2.Learn microtomy skills and how to prepare a tissue slide
	CC7	**CC 7 – Genetics**	The student will be able to: 1. Understand how DNA encodes genetic information and the function of mRNA and tRNA. 4. Apply the principles of Mendelian inheritance. 5. Understand the cause and effect of alterations in chromosome number and structure. 6. Relate the conventional and molecular methods for gene manipulation in other biological systems. 7. Discuss and analyse the epigenetic modifications and imprinting and its role in diseases. 8. Get new avenues of joining research in related areas such as genetic engineering of cells, cloning, genetic disorders, human fertility programme, genotoxicity, etc
	SEC1	**SEC 1 Paper-1 (Group A)- APICULTURE (Theory)**	The students will develop theknowledge of 1. Concepts of Biology of Honeybees, Classification, Bee Rearing Methods, Products of Bee Culture and their Industrial uses, Diseases and pest of Honeybee and their management. 2. Recent efforts and modern methods employed in Bee-Keeping Industry
IV	CC8	**CC 8 -Comparative Anatomy of**	The student will: 1. Develop an understanding of the

		Vertebrates	evolution of vertebrates thus integrating structure, function and development. 2. Have an overview of the evolutionary concepts including homology and analogy and comparison of anatomy of major organsystems from simpler to complexvertebrates. 3.Acquire dissecting skills for various systems of vertebrates. 4. Learn to compare bones of different groups of vertebrates
	CC9	**CC 9 - Animal Physiology: Life Sustaining Systems**	The students will: 1.Understand the process of digestion and its control. 2. Develop understanding in thermoregulation mechanism. 3. Learn the process of respiration and transport of gases. 4. Understand kidney structure and regulation of urine formation. 5. Understand heart structure and functioning.
	CC10	**CC 10 - Fundamentals of Biochemistry**	The students will be able to: 1.Understand the structure and biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids. 3. Understand the structure and function of immunoglobulins. 4. Understand the concept of enzyme, its mechanism of action and regulation. 6. Learn the preparation of models of peptides and nucleotides. 7. Learn biochemical tests for amino acids, carbohydrates, proteins and nucleic acids. 8. Learn measurement of enzyme activity and its kinetics.
	SEC2	**SEC 1 Paper-2 (Group A)- SERICULTURE**	The student will be able to: 1.Identify the diseases and pests of the mulberry plant. 2.It also involves giving students a thorough knowledge about the cultivation of mulberry, maintenance of

			the farm, seed technology, silkworm rearing and silk reeling. 3. Students get to learn about the quality of various things like leaf, seed cocoon, commercial cocoon and fibre so that they can get maximum return when actually practiced. 4. Learn about the various skills that are necessary for self employment in the mulberry and seed production.
V	**CC11**	**CC 11 - Molecular Biology**	Students will; 1. Develop an understanding of concepts, mechanisms and significance and relevance of molecular biology in the current scenario. 2. Understand the process of DNA replication, transcription and translation. 3. Get well versed in molecular DNA technology which holds application in biomedical & genomic science, agriculture, environment management, etc. 3. Apply their knowledge in laboratory for identifyinglampbrush chromosome. SDS PAGE and DNA isolation skills.
	CC12	**CC 12 – Immunology**	Students will be able to: 1. Identify the major cellular and tissue components which comprise the innate and adaptive immune system. 2. Understand how are immune responses by CD4 and CD8 T cells, and B cells, initiated and regulated. 3. Understand how does the immune system distinguish self from non-self. 4. Develop skills to prepare blood film slide to identify and analyse white blood cells
	DSE1	**DSE Paper 1 (Group A) -Reproductive Biology**	The student will be able to : 1.Understand Reproductive system-male and female 2.Will know the role of various hormones in reproduction and 3.Learn ther skill of preparing histological slides of reproductive tissues.
	DSE2	**DSE Paper 2 (Group A) -Animal Behaviour and Chronobiology**	The student will: 1.Learn a wide range of techniques used to study animal behaviour.

			2. Develop skills, concepts and experience to understand different aspects of animal behaviour. 3. Understand patterns of animal behaviour 4. Consider and evaluate behaviour of all animals,and how environment and time affects behaviour 5. Observe basic behaviours of animals in the laboratoryeg: phototaxis in soil arthopods, aggressive behaviour of fishes.
VI	CC13	**CC 13 - Developmental Biology**	The student will be able to: 1. Develop critical understanding how a single-celled fertilized egg becomes an embryo and then a fully formed adult by going through three important processes of cell division, cell differentiation and morphogenesis. 2. Understand how developmental processes and gene functions within a particular tissue or organism can provide insight into functions of other tissues and organisms. 3. Realize that very similar mechanisms are used in very diverse organisms; and development is controlled through molecular changes resulting in variation in the expression and function of gene networks. 4. Develop skills in preparing whole mounts of different developmental stages of chick
	CC14	**CC 14–Evolutionary Biology & Biostatistics**	The student will be able to: 1. Develop critical understanding how animals changed from a primitive cell to a collection of simple cells to form a complex body plan. 2. Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic tree. 3. Understand how morphological change due to change in environment helps drive evolution over a long period of time. 4. Learn biostatistics and its use in biological research.

I / III	GE Paper 1	**Animal Diversity**	This is the classical part of Zoology. The students will get the vivid idea of: 1. Entire animal kingdom with proper reasons. Non-Chordates are classified upto Class and Chordates are classified upto Order. 2. Knowing the different physiological aspects they will understand that each organisms are unique and different in their own way.
II / IV	GE Paper 2	**Animal Physiology**	Students will understand about: 1.Nervous system and how it reacts against every single stimulus. 2.How breathing take place and thr respiratory gases transported through blood. 3.Elimination of metabolic waste through kidney and the function of endocrine system to effect other physiological activities.

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B.Sc Programme (General)

Semester	Course Code	Course Title	Outcomes
I	DSC1	**DSC-Paper I ANIMAL DIVERSITY**	The students will get a clear knowledge of 1. Understanding invertebrate and vertebrate classification by Identification of characteristic features of each taxon up to class level for non-chordates and up to Order level for Chordates. 2. Discussing special features specific to different phyla like locomotion in protest, canal system in Porifera, life history of some platyhelminth and nemathelminth parasites, metamerism in annelids, metamorphosis in arthropods, water vascular system in echinoderms. 3. Study on classification and salient features of several protochordatesand chordate forms and discussing special features like osmoregulation in fishes, parental care in amphibians, biting mechanism in snake, flight adaptation in birds and exo-skeletal derivatives in mammals. 4.Gaining expertise in invertebrate dissection by studying various systems of Cockroach. 5.Preparation of Animal album project.
II	DSC2	**DSC Paper 2- COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES**	The student will be able to 1.Explore anatomical variations in different animal systems by studying their brief accounts. 2. Gaining knowledge of early and late embryonic development with relation to sea-urchin, frog, chick and mammals. 3.The students will develop the skill to Visually identifying astrological specimen, gaining knowledge about Larval forms of various Invertebrate Phyla, Learning to identify different types of Placenta and chick embryo Histologically.
III	DSC3	**DSC Paper 3- PHYSIOLOGY**	The student will be able to 1.Gainknowledge about the basic

		AND BIOCHEMISTRY	physiological functions like Digestion, Respiration, Circulation, Excretion, Control and coordination. 2. Learning various pathways of Carbohydrates, Lipids and Protein Metabolism. Understanding various concepts of Enzyme actions. The students will develop the skill to 3. Identification of some permanent Mammalian Histological sections and quantitative analysis of Carbohydrates samples.
IV	DSC4	**DSC- Paper 4 GENETICS AND EVOLUTIONARY BIOLOGY**	The student will be able to 1. Learn basic concepts of classical Mendelian genetics and learning concepts of it's extension. 2. Basic concept of recombination using Holiday model, different types of chromosome and gene mutation, fundamental basis of sex determination Describing chemical origin of life on earth. 04. Understanding various theories of evolution, learning how isolating mechanisms and natural selection favour evolution and origin of new species. The students will develop the skill to 5. Study of concepts of Human aneuploidy, Phylogeny of horse and evolution of Darwin finches using photographs. 6. Develop idea about evolutionary basis in fossil and extant animals and importance of conservation of museum specimens.
III / V	SECP1	**SEC 1 Paper-1 (Group A)- APICULTURE**	The students will develop the knowledge to know: 1. Concepts of Biology of Honeybees, Classification, Bee Rearing Methods, Products of Bee Culture and their Industrial uses, Diseases and pest of Honeybee and their management. 2. Recent efforts and modern methods employed in Bee-Keeping Industry
IV / VI	SECP2	**SEC 1 Paper-2 (Group A)- SERICULTURE**	The student will be able to: 1. Identify the diseases and pests of the mulberry plant.

			2.It also involves giving students a thorough knowledge about the cultivation of mulberry, maintenance of the farm, seed technology, silkworm rearing and silk reeling. 3. Students get to learn about the quality of various things like leaf, seed cocoon, commercial cocoon and fibre so that they can get maximum return when actually practiced. 4. Learn about the various skills that are necessary for self employment in the mulberry and seed production.