

SARAT CENTENARY COLLEGE

Department of Zoology

Course Outcomes (CBCS)

Zoology Honours and Zoology General

SEM-I

CC-1: Non-Chordates – I

1. Introducing CBCS students about the basics of animal classification; knowledge and understanding of diverse non-chordates (from unicellular Protista to multicellular Nematode helminths), their general characteristics, classifications, life-cycle patterns, and representative animals.
2. Practical field of knowledge includes identifications of non-chordate animals through preserved specimens, which represent different groups; staining and whole mounting of a few protozoans and also mounting of protozoans and helminths from gut content of cockroach.

CC-2: Ecology

1. Introduce students with the basic concepts and detailed study of ecology, population, community, ecosystem and applied ecology.
2. Knowledge about wildlife conservation and management strategies of tiger conservation including wildlife protection act (1972).
3. Practical knowledge about studying life tables and plotting survivorship curves from given data, determining population densities, analyse diversity; measurement of different bio-chemical and biological parameters of an aquatic ecosystem.
4. Study of biodiversity through field study.

CC-Zoology 1A/ GE-1: Animal Diversity

1. To understand the existing diversity of the animal kingdom from unicellular Protista to multicellular and non-chordate to chordate animals, through studying different phyla.
2. To be able to distinguish different species on the basis of their characteristic features.
3. To be able to understand the complexity of life forms easily.
4. To build a clear concept about non-chordate and chordate animals.
5. To gain knowledge about the morphological, physiological and evolutionary aspects of different phyla and their lower taxa.
6. Structural and anatomical peculiarities among different classes of vertebrates.

SEM-II

CC-3: Non-Chordates-II:

1. A basic concept on the evolution of coelom and metamerism.
2. A knowledge on the general characteristics, classification, life-cycle patterns of representative nonchordate animals from phylum Annelida to Hemichordata.
3. Identifications of the above-mentioned nonchordate animals and practical training of anatomical study of some coelomate specimens like earthworms and cockroaches.

CC-4: Cell Biology:

1. Overview of basic and ultra-structure of cells with functional approach of prokaryotes and eukaryotes with reference to plasma membrane and different cell-organelles, cytoskeleton, cell-cycle and cell-signalling.
2. Practical training on staining, mounting and identification of different stages of mitotic and meiotic cell divisions; permanent slide preparation to show positive Barr-body test in female cells.
3. Study of cell viability by **Trypan Blue** staining in blood cells / onion root tip cells.

CC-2A/ GE-2: Comparative Anatomy and Developmental Biology of Vertebrates:

1. To learn about the comparative study of different organ-systems in different vertebrate groups.
2. To understand the importance of integumentary system and their derivatives with reference to bodily functions.
3. To study the comparative study and evolution of skeletal system, digestive system, respiratory system, circulatory system, nervous system, brain and other sense organs.
4. To study the early and late embryonic development in detail and the fundamental processes of control of the different development.

SEM-III

CC-5: Chordates:

1. To gain a sum total knowledge about classification of phylum Chordata.
2. To start a journey of knowledge about a special behaviour like migration in fish and birds, parental care in fish and amphibian, poison apparatus in snake, echolocation in Microchiroptera and cetacean.
3. Gains knowledge of functional anatomy of vertebrate from fish to mammals
4. Knowledge about distribution of animal in world and division of world into realms accordingly.
5. Achieving practical knowledge to identify species taxonomically.

CC-6: Animal physiology:

1. Introduction to different types of tissues, bones and cartilages in human-body and an elaborate knowledge on each type.
2. Detailed concept of action potential and its propagation.

3. Knowledge about physiology of different type of muscle and muscle contraction
4. To learn the concept of endocrine system and gain knowledge about hormones.
5. Gain practical knowledge of histological preparation and histological studies of tissues of various organs of mammals (Lab bred rats).

CC-7: Biochemistry:

1. Introduction to biomolecules like carbohydrates, proteins, lipids, nucleic acids, amino acids and their role in metabolism.
2. Introduction to enzymes and oxidative phosphorylation.
3. Gain practical knowledge of qualitative and quantitative measurement of biomolecules, paper chromatographic techniques.

SEC-1: Apiculture: (for both 3rd Sem Zoology Honours and General)

1. Provides basic idea about honeybees, their history, classification and biology to rear them properly for obtaining honey, bee-wax and bee-venom.
2. To know social organization of honeybees and bee pasturage for artificial rearing techniques by introducing Newton and Langstroth artificial bee- hives.
3. To select proper bee species (indigenous and exotic) for Apiculture.
4. Basic idea of the methods of honey extraction (Indigenous and Modern).
5. Be acquainted with the diseases and enemies of honeybees with control & preventive measures.
6. To start up business or entrepreneurships in the field of profitable beekeeping industry to obtain honey, bees-wax, and propolis; recent efforts for employing artificial beehives for cross- pollination in crop fields and horticultural gardens.

CC-1C/ GE-3: Physiology and Biochemistry

1. To gain knowledge about the various metabolic and physiological mechanisms of whole human body.
2. To gain fundamental knowledge about animal physiology.
3. To build clear ideas and concepts about the mechanisms that work to keep the human body alive and functioning.
4. To understand the mechanism of enzyme action.
5. To understand the (biochemical) activity of medicines.

SEM-IV

CC-8: Comparative Anatomy Vertebrates:

1. Provides the understanding of structural organisation of different systems such as, integumentary, skeletal, digestive, respiratory, circulatory, urinogenital, nervous and sensory organs in comparative way among the different vertebrate groups.
2. Also offering practical knowledge on integumentary system and skeletal system of different groups of vertebrates; moreover, nervous/sensory system like brain and pituitary gland are also understood through dissection of vertebrate specimens.

CC-9: Animal Physiology: Life Sustaining Systems:

1. Provides the detail knowledge about different life sustaining systems of vertebrates such as the process of digestion, respiration, circulation with the detailed understanding of heart, homeostatic mechanisms (thermoregulation and osmoregulation), excretion with structural information of renal system.

2. In addition, it offers practical knowledge on blood grouping, estimation of haemoglobin and measurement technique of blood pressure by sphygmomanometer.

CC-10: Immunology:

1. Provides knowledge about structures and functions of immune cells, immunoglobulins, antigens and their interactions with antibodies.
2. They will know about major histocompatibility complex (MHC) molecules, cytokines, complement system, hypersensitivity reactions and cellular mode of immunity development, immunology of different bacterial or viral diseases and clinical application of immunology i.e., vaccination.
3. Also offering practical knowledge on lymphoid tissues/organs through histological slides, identification of the immunological organs through model/photograph, blood cell morphology and count of WBC and demonstration on immunological techniques like ELISA.

SEC-2: Medical Diagnostic techniques:

1. Medical diagnostic techniques are very important in detecting different diseases and other health concerns including cancer.
2. The diagnostic methods are used for analysis of blood, urine, stool, sputum etc. for the detection of infectious (like tuberculosis, hepatitis, malaria) and non-infectious (Hypertension, Diabetes Type I and Type II) diseases; moreover, clinical biochemistry (LFT, Lipid profiling etc.) and Microbiology (Antibiotic Sensitivity Test) are also used for these purposes.
3. The diagnostic techniques like PET, MRI, CT scan also helps to know about types of tumours benign or malignant, their detection and metastasis; and other medical imaging like X-Rays detects bone fracture.

CC-1D/ GE-4: Genetics and Evolutionary Biology

1. To understand the process of evolution.
2. To understand the formation of few species.
3. To gain knowledge about the genetic overview of evolution.
4. To understand the world at different age levels.
5. To build concept about the diversification of different species.

SEM-V

CC-11: Molecular Biology

In this module, students will learn about understanding the interactions between the various systems of a cell, including the interactions between DNA, RNA, and protein biosynthesis, the transcription factor as well as learning how these interactions are regulated.

CC-12: Genetics

- Students will acquire knowledge about how genes act and how they are propagated through the generations, the study of the behaviour of genes in populations, recombination process of bacteria and viruses.
- They will understand various aspects of Test and chi-square in the biological field.

DSE-1: Animal Biotechnology :

Animal biotechnology is a branch of biotechnology in which molecular biological techniques are used to genetically engineer animals in order to improve their suitability for agriculture, industrial and pharmaceutical applications.

Students have been facilitated to learn about the recent progress in sequencing animal genomes, gene expression, various tools & techniques related to molecular biology and cell culture of animal cells also.

DSE-2- Parasitology:

1. Parasitology is the study of parasites, their hosts and the relationship between them. The scope of parasitology is not only determined by the organism or environment but the way of life how they completed in host body.
2. Furthermore, students gain hands-on experience with isolation and fixation of nematode/cestode parasites and identification of their life history stages particularly diagnostic stage & infective stage.

SEC-3: Sericulture:

Provides basic idea of sericulture, detailed idea about host plants, silk worm rearing, types and composition of silk, pests and diseases associated with silk worm and also prospects of sericulture in India.

1. To understand the history, types, races and present status of sericulture in India.
2. To understand the prospect and employment potential of sericulture.
3. To gain knowledge about the detailed steps of mulberry cultivation or mori-culture which is an integral part of Sericulture.
4. To gain knowledge about the various sericulture centres in India.
5. To have a basic concept about the various techniques involved in the rearing of silkworm)

SEM-VI

CC-13: Developmental Biology:

1. Students will gain knowledge about early, late and post embryonic development of animals.
2. Concept on IVF, stem cell, teratogenesis and amniocentesis will be cleared.
3. Able to identify developmental stages of Chick embryo and placental sections of mammals and life cycle *Drosophila*.
4. Project report on *Drosophila* culture/ chick embryo development.

CC-14: Evolutionary Biology:

1. Concept on the origin of life.

2. Knowledge on evolutionary concepts, geological time scale, natural selection and speciation.
3. Idea of population genetics and extinction.
4. Construction and interpretation of phylogenetic trees using Parsimony, convergent and divergent evolution.
5. Study of fossils, homology and analogy from specimens, problem relate to HW equilibrium.

DSE-3: Animal Behaviour & Chronobiology:

1. Concept of animal behaviour, patterns of behaviour, social and sexual behaviour, and chronobiology & biological rhythm.
2. Study of nests, geotaxis, phototaxis, actogram, and circadian functions.
3. Field study.

DSE-4: Endocrinology:

1. Concept of endocrinology, epiphysis, Hypothalamo-hypophysial axis, peripheral endocrine glands and regulation of hormone action.
2. Hands on training about dissection and display of endocrine glands in rat.
3. The course trains a student to know what the of Tissue fixation, embedding in paraffin, microtomy and slide preparation of endocrine gland.

Name of the Department: Zoology

Programme Outcome

A student completing B. Sc. (Hons.) in Zoology will gain the following skills and knowledge allowing him or her to pursue further studies.

- The course fosters an interest in diverse floral as well as faunal composition, laws of heredity, and principles, as well as the metabolic pathways underlying animal physiology control and coordination.
- Students pursuing Honours in Zoology generally learn the fundamentals of apiculture, sericulture, aquarium fish keeping, and poultry farming.
- This course also prepares students to analyse ecological problems, conduct environmental monitoring, and perform pedigree analysis. Furthermore, students gain hands-on experience with haematological, histological, biochemical and microbial analysis.
- The course sparks students' interest in furthering their education and conducting research in various branches of the life sciences, such as fisheries, molecular biology, microbiology, immunology, parasitology, and so on.
- The students of Zoology Honours are required to perform simple experiments in the laboratory as well as in the field to validate many facets of Zoology and supplement classroom lectures.
- Students can pursue careers in academic institutions such as schools, colleges, universities, research institutes, forensic laboratories, and zoological gardens, as well as in government sectors such as block level fishery extension officers, municipalities (entomologists), and so on.