

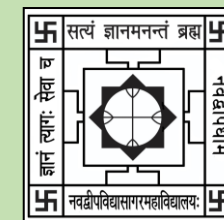


Nabadwip Vidyasagar College

Department of Zoology

Under Graduate Programme

Programme Outcome (PO) and Course Outcome (CO)



Programme Outcome: (PO)

- ✓ After completing the programme students should be able to identify, classify the faunal diversity of nature, and differentiate the chordates and nonchordates based on their morphological, anatomical and physiology. They will also be able to describe economic, ecological and medical significance of various animals in human life.
- ✓ They would have a vivid knowledge about the different animals and their role (niche) in nature so that they can participate in animal management programmes in an effective manner
- ✓ Awareness and identification regarding various pathogens and vectors causing deadly diseases like Malaria, Dengue, kalaazar or leishmaniasis, Amoebiasis, Ascariasis, Filariasis with the future scope of application in fields of pharmacy and pathological labs
- ✓ First hand identification skill of different arthropods, annelids, molluscs with future scope of application in various environment related jobs
- ✓ Enhancing student perception through laboratory and field studies
- ✓ First hand skill of data analysis through statistical methods, maintain and organize museum specimen with further scope of job in institutions like ZSI
- ✓ Prepare and motivate students for research studies in Zoology and related fields
- ✓ Inculcate problem solving skills, thinking, creativity and oral presentation skills through assignments, project work, seminars
- ✓ After completing the course students can pursue post-graduation in mother subject and other allied subjects too and apply for the job of assistant professors in various national and international college, university and research institutions.
- ✓ After completion of doctoral degree, they can be employed as research associate in various laboratories
- ✓ They can always opt for school teaching jobs in different govt and private schools
- ✓ They can apply for jobs as wild life scientists, conservationists, Zoo curators, wild life forensics, crime forensics, taxonomists in various pharmaceutic industry, public health department, research institutions, lab technicians and medical representatives
- ✓ Throughout the course they are indulged to be curious towards nature and can opt for wild life photography or wild life explorers as future career options.

Semester	Core Courses	Content of KU Syllabus	Course Outcome (CO)
1	ZOOL-H-CC-T-01 (Non-chordates I: Protista to Pseudocoelomates)	Unit 1: Basics of Animal Classification	1. The main aim of this chapter is to know the basics of properly identifying a organism and its classification 2. details of different Codes of Zoological Nomenclature and their applications in different fields 3. Knowledge about Principle of Priority; Synonymy and Homonymy and their application in field of taxonomy
		Unit 2: Protista and Metazoa	1. identification and life cycle study of various protozoa 2. study about various free living and parasitic protozoa of economic importance 3. study about the evolution of symmetrical and segmented animals from the primitive ones.
		Unit 3: Porifera	1. Study about General characteristics and types of sponges with emphasis on some specific systems
		Unit 4: Cnidaria	1. this chapter concentrates on Study of cnidarians, their reproduction 2. Polymorphism in Cnidaria is explained in details 3. study about Corals and coral reef To increase consciousness regarding importance and conservation of corals and coral reefs Through this chapter the eminent threats on the coral reefs
		Unit 5: Ctenophora	Brief knowledge on identification of ctenophores
		Unit 6: Platyhelminthes	1. study about General characteristics and Classification of platyhelminth worms 2. knowledge about the infective stages and symptoms of fasciola infection on human and other domestic animals 3. 3.knowledge about various treatment methods and medications available for fascioliasis
		Unit 7: Nematoda	1. study about General characteristics and Classification of aschelminth worms 2. knowledge about the infective stages and symptoms of Ascaris and wuchereria infection in human 3. Knowledge about various treatment methods and medications available for Ascariasis and filariasis

1	ZOOL-H-CC-T-02 (Non-Chordates II: Coelomates)	Unit 1: Introduction	Study about the evolution of complex body patterns from the simple ones
		Unit 2: Annelida	study and identification of various annelids and their practical utility through the study of their systems
		Unit 3: Arthropoda	study and identification of various arthropods and their practical utility through the study of their systems
		Unit 4: Onychophora	General characteristics and a knowledge on the concept of connecting link through study of Peripatus
		Unit 5: Mollusca	1. General characteristics and Classification up to subclasses 2. study on effect of torsion in Gastropoda
		Unit 6: Echinodermata	study and identification of various echinoderms and their practical utility through the study of their systems study about the evolution of chordates through echinoderms
		Unit 7: Hemichordata	General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates
2	ZOOL-H-CC-T-03 (Perspectives in Ecology)	Unit 1: Introduction to Ecology	A basic knowledge of the world and habitat around us and the basic principles
		Unit 2: Population	1. Study on Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal. A thorough knowledge on preparation of this through data analysis and its application in real world 2. study on different aspects of population growth and the factors affecting it 3. a knowledge on Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition, predator-prey cycling.
		Unit 3: Community	This chapter deals with the concept of biodiversity and different attributes of a community A study on the succession of a community and identification of the different seral stages.
		Unit 4: Ecosystem	To understand the ecology of a pond in detail, A knowledge on different types of Food chain and web operating in nature and their importance Study of Energy flow through the ecosystem and its importance

			Ecological pyramids and Ecological efficiencies. study of Nitrogen cycle and its importance in nature.
		Unit 5: Applied Ecology	1. this chapter introduces the very imp concept of conservation and its need to us through the processes of in-situ and ex-situ conservation. 2. study on Management strategies for tiger conservation; Wild life protection act (1972).
2	ZOOL-H-CC-T-04 (Cell Biology)	Unit 1: Overview of Cells	This chapter focusses on the structural variety of viruses and bacteria with very important identification skills of gram negative, gram positive and archaebacteria
		Unit 2: Plasma Membrane	1. students can understand the concept of semipermeable barrier and various transport processes through cell membrane 2. the concept of cell junctions and its importance and role played in cancer biology is dealt here
		Unit 3 and 4: Cytoplasmic organelles	This chapter introduces the very importance concept of various cellular organelles and their role in an animals physiology and their mechanism of work
		Unit 5: Cytoskeleton	Type, structure and functions of cytoskeleton are studied in details with their importance in diseases like cncer, cardiovascular disease syndromes, neurodegeneration, liver cirrhosis etc
		Unit 6: Nucleus	Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome).
		Unit 7: Cell Division	This is a very important chapter related to Cell cycle check points and cancer . Concept of oncogenes and tumor suppressor genes are dealt with
		Unit 8: Cell Signaling	Various cell signalling pathways and their implications in disease states are discussed in details Concept of apoptosis and necrosis with their role in normal physiology are discussed
3	ZOOL-H-CC-T-05 (Diversity of Chordata)	Unit 1: Introduction to Chordates	this chapter discusses the basic characters of chordates
		Unit 2: Protochordata	Explains General characteristics and classification of the lower group of chordates.

		Unit 3: Origin of Chordata	Explains about of origin of chordates.
		Unit 4: Agnatha	Introduces the concept of jawless vertebrates
		Unit 5: Pisces	Students study about identification of various fish and their practical utility through the study of their systems and migration patterns
		Unit 6: Amphibia	1. study and identification of various amphibians and their systems 2. Metamorphosis and parental care in Amphibia and the hormonal factors involved
		Unit 7: Reptilia	1. study and identification of various reptiles and their practical utility through the study of their systems 2. students learn to differentiate b/n poisonous and non poisonous snakes 3. Poison apparatus and Biting mechanism in Snake are also studied
		Unit 8: Aves	1. General characteristics and identification of basic characters of birds 2. study about migratory birds with their navigator mechanism 3. Principles and aerodynamics of bird flight.
		Unit 9: Mammals	1. study about characters of mammals 2. study about echolocation in bats
		Unit 10: Zoogeography	Zoogeographical realms, Plate tectonic and Continental drift theory and study of distribution of birds and mammals in different realms
		Unit 1: Tissues	Structure, location, classification and functions of epithelial tissue.
		Unit 2: Bone and Cartilage	Structure and types of bones and cartilages, and process of Ossification is studied
3	ZOOL-H-CC-T-06 (Animal Physiology: Controlling & Coordinating Systems)	Unit 3: Nervous System	Students deal with the process of nerve and synaptic transmission in this chapter
		Unit 4: Muscular system	Students deal with the process of muscular contraction in this chapter

		Unit 5: Reproductive System	Histology of testis and ovary and Physiology of Reproduction is reviewed here
		Unit 6: Endocrine System	This chapter deals with the endocrine glands and the hormones and their roles
3	ZOOL-H-CC-T-07 (Fundamentals of Biochemistry)	Unit 1: Carbohydrates	Study about various aspects of Carbohydrate metabolism and its role in physiology
		Unit 2: Lipids	Study about various aspects of lipid metabolism and its role in physiology
		Unit 3: Proteins	Study about various aspects of protein and amino acid structure and metabolism and its role in physiology
		Unit 4: Nucleic Acids	Study about various aspects of nucleotide structure and metabolism and its role in physiology
		Unit 5: Enzymes	Study about various aspects of enzyme types and mode of action and its role in physiology
		Unit 6: Oxidative Phosphorylation	Redox systems; Review of mitochondrial respiratory chain, Inhibitors and uncouplers of Electron Transport System.
4	ZOOL-H-CC-T-08 (Comparative Anatomy of Vertebrates)	Unit 1: Integumentary System	Structure, function and derivatives of integument in amphibian, birds and mammals are studied
		Unit 2: Skeletal System	Jaw suspension; structure of branchial and visceral arches
		Unit 3: Digestive System	Comparative anatomy of stomach; dentition in mammals
		Unit 4: Circulatory System	Comparative account of heart and aortic arches
		Unit 5: Respiratory System	Respiratory organs in Pisces, Aves and Mammalia.

		Unit 6: Urinogenital System	Succession of kidney, Types of mammalian uteri.
		Unit 7: Nervous System	Cranial nerves in mammals
		Unit 8: Sense Organs	Classification of receptors, Brief account of auditory receptors in vertebrate
	ZOOL-H-CC-T-09 (Animal Physiology: Life Sustaining Systems)	Unit 1: Physiology of Digestion	Process of digestion in human is discussed
		Unit 2: Physiology of Respiration	Process of respiration in human is discussed
		Unit 3: Physiology of Circulation	1. Components of Blood and their functions; Structure and functions of haemoglobin. 2. Haemostasis; Blood clotting system, Fibrinolytic system. 3. Haemopoiesis; Basic steps and its regulation. 4. Blood groups; ABO and Rh factor.
		Unit 4: Physiology of Heart	1. Structure of mammalian heart, Coronary Circulation, Origin and conduction of cardiac impulses 2. Cardiac Cycle and cardiac output 3. Blood pressure and its regulation
		Unit 5: Thermoregulation & Osmoregulation	1. Physiological classification based on thermal biology. 2. Thermal biology of endotherms. 3. Osmoregulation in aquatic vertebrates. 4. Extrarenal osmoregulatory organs in vertebrates
		Unit 6: Renal Physiology	Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance.
4	ZOOL-H-CC-T-10 (Immunology)	Unit 1: Overview of Immune System	Basic concepts of health and diseases, Cells and organs of the Immune system.
		Unit 2: Innate and Adaptive Immunity	Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).

		Unit 3: Antigens	Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity.
		Unit 4: Immunoglobulins	Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production.
		Unit 5: Major Histocompatibility Complex	Structure and functions of MHC molecules. Structure of T cell Receptor and its signaling.
		Unit 6: Cytokines	Types, properties and functions of cytokines.
		Unit 7: Complement System	Components and pathways of complement activation.
		Unit 8: Hypersensitivity	Gell and Coombs' classification and brief description of various types of hypersensitivities.
		Unit 9: Immunology of diseases	Malaria, Filariasis, Dengue.
		Unit 10: Vaccines	Various types of vaccines. Active & passive immunization (Artificial and natural).
5	ZOOL-H-CC-T-11 (Molecular Biology)	Unit 1: Nucleic Acids	Students are made aware of Watson and Crick Model of DNA.
		Unit 2: DNA Replication	Mechanism of DNA Replication in prokaryotes and eukaryotes is studied here
		Unit 3: Transcription	Mechanism of protein synthesis in both prokaryote and eukaryote are studied.
		Unit 4: Translation	Mechanism of RNA synthesis in both prokaryote and eukaryote are studied
		Unit 5: Post Transcriptional Modifications and	Various aspects of post transcriptional RNA processing is discussed

		Processing of Eukaryotic RNA	
		Unit 6: Gene Regulation	The very important concept of operon is studied through lac and trp operon Regulation of Transcription in eukaryotes through action of Activators, enhancers, silencer, repressors miRNA mediated gene silencing is also discussed in this chapter
		Unit 7: DNA Repair Mechanisms	Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair.
		Unit 8: Molecular Techniques	PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing.
5	ZOOL-H-CC-T-12 (Principles of Genetics)	Unit 1: Mendelian Genetics and its Extension	1. Students study about the Principles of inheritance, both Mendelian and Non Mendelian inheritances,. 2. the topics of Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance.
		Unit 2: Linkage, Crossing Over and Chromosomal Mapping	Students are guided through topics of linkage and crossing over and linkage mapping problems
		Unit 3: Mutations	This chapter deals with mechanism and types of mutation and their relation to diseases.
		Unit 4: Sex Determination	1. Mechanisms of sex determination in <i>Drosophila</i> and human are compared 2. Dosage compensation in <i>Drosophila</i> and Human are also compared
		Unit 5: Extra-chromosomal Inheritance	Criteria for extra chromosomal inheritance with example of Kappa particle in <i>Paramoecium</i> .
		Unit 6: Recombination in	Conjugation, Transformation, Transduction, Complementation test in Bacteriophage.

		Bacteria and Viruses	
		Unit 7: Transposable Genetic Elements	Transposons in bacteria, P elements in <i>Drosophila</i> , LINE, SINE, Alu elements in humans.
6	ZOOL-H-CC-T-13 (Developmental Biology)	Unit 1 and 2: Early and late Embryonic Development	Concepts of early and late embryonic development in human are studied in details
		Unit 3: Post Embryonic Development	Development of brain and Eye in Vertebrate and process of Regeneration is studied through examples
		Unit 4: Implications of Developmental Biology	This chapter discusses on the very relevant topics of Teratogenic agents and their effects on embryonic development; <i>In vitro</i> fertilization, Stem cell (ESC) and Amniocentesis.
6	ZOOL-H-CC-T-14 (Evolutionary Biology)	Unit 1	Studies on geological time scale and molecular theory of evolution
		Unit 2	This chapter courses through topic of population genetics and HW equilibrium through various theories and sums
		Unit 3	Chapter deals on Species concept, Isolating mechanisms, modes of speciation and Adaptive radiation
		Unit 4	This chapter deals with evolution of human and how it differs from ape
		Unit 5	This chapter deals with Phylogenetic trees and their Construction & interpretation through various methods
5	ZOOL-H-DSE T-01 (Fish and Fisheries)	Unit 1 -5	This entire elective subject deals with economic aspects of diff types of fisheries and its implication. Students get to learn not only about physiology of fish but also the practical application parts like preparation of fish diet, preservation , processing of fish, fishery by products etc

5	ZOOL-H-DSET-03 (Wildlife conservation and Management)	Unit 1 -8	This elective subject deals with different aspect of wild life management and conservation. Students gets to know about different methods of population counting with special emphasis on tiger conservation and census methods
6	ZOOL-H-DSET-04 (Parasitology)	Unit 1 -6	This elective subject deals with the proper definition of parasite, parasitoid and vectors. Students come to know about the causative agents and symptoms of various deadly diseases with their treatment options
6	ZOOL-H-DSET-05 (Endocrinology)	Unit 1 -4	This elective subject deals with the endocrine glands and their function, with the mode of hormone action. Students can implement this knowledge in detection of various pathological and endocrinological disorders. They also gets a knowledge on immunoassay techniques and their laboratory interpretation.
6	ZOOL-H-DSET-06 (Biology of Insecta)	Unit 1 -7	In these units students learn about insect physiology and various harmful and friendly insects.
3	ZOOL-HSEC- 01 Aquarium Fish Keeping	Unit 1 -4	This SEC subject introduces the concept of aquarium fishes, their types, identification, maintenance, feeding and management
3	ZOOL-HSEC- 02 Apiculture	Unit 1 -4	This SEC subject introduces the concept of bee keeping and its economic aspects, students can implement this knowledge in future as apiarist and apiary scientists
4	ZOOL-HSEC- 03 Sericulture	Unit 1 -5	This SEC subject introduces the concept of silkworm keeping and its economic aspects, students can implement this knowledge in future as sericulture scientists and commercial silk production industries
4	ZOOL-HSEC- 04 Medical Diagnostic Techniques	Unit 1 -8	This chapter familiarizes students with various important medical diagnostic tools like X-Ray of Bone fracture, PET, MRI and CT Scan, LFT, Lipid profiling, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R),

			Packed Cell Volume (P.C.V.). and diagnosis techniques of Tuberculosis and Hepatitis, Malarial parasite
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