

Department of Zoology
N. L. College

Programme Specific Outcome

1. Students will be able to apply the scientific method to questions in biology by formulating testable hypotheses, gathering data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.
2. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.
3. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.
4. Students will be able to apply fundamental mathematical tools (statistics, calculus) and physical principles (physics, chemistry) to the analysis of relevant biological situations.
5. Students will be able to identify the major groups of organisms with an emphasis on animals and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of animals that differentiate them from other forms of life.
6. Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped animal morphology, physiology, life history, and behavior.
7. Students will be able to explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system. Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and behavior of different forms of life.
8. Students will be able to explicate the ecological interconnectedness of life on earth by tracing energy and nutrient flows through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.
9. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

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COURSE OUTCOMES

**NON-CHORDATES - I: PROTISTS TO PSEUDOCOELOMATES
THEORY-ZOO-101**

On completion of the course, students are able to:

1. Understand the evolution, history of phylum.
2. Understand about the Non Chordate animals.
3. To study the external as well as internal characters of non chordates.
4. To study the distinguishing characters of non chordates.
5. Understand the Parasitic adaptations in helminthes.

**PRINCIPLES OF ECOLOGY
THEORY -CT-4-ZOO-103**

On completion of the course, students are able to:

1. Understand the levels of organization.
2. Types of ecosystems , Food chain, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies.
3. Population, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion.
4. Community characteristics: species richness, Ecotone and edge effect; Ecological succession, Theories pertaining to climax community.
5. Wildlife Conservation and Management, Concept of Biodiversity.

**NON-CHORDATES II: COELOMATES
THEORY - Zoo-201**

On completion of the course, students are able to:

1. Understand development of coelom and metamerism in Annelida.
2. Arthropoda and Onychophora -General characteristics and Classification, Metamorphosis in Insects.
3. General characteristics and Classification of Molluscs , Evolutionary significance of trochophore larva.
4. General characteristics of echnodermata, Water-vascular system in Asteroidea

CELL BIOLOGY THEORY -Zoo-203

On completion of the course, the students will be able to:-

1. Understand the structural organization of cell, Tight junctions, Desmosomes, Gap junctions.
2. Structure and Functions of Endoplasmic Reticulum, Golgi apparatus, Lysosomes, Mitochondria.
3. Structure and Functions of Microtubules, Microfilaments and Intermediate filaments.
4. Mitosis, Meiosis, Cell cycle and its regulation, Cell Signalling and concept of receptors,

DIVERSITY OF CHORDATA Theory- Zoo-301

On completion of the course, the students will be able to:-

1. General characteristics of Hemichordata, Urochordata and Cephalochordata.
2. General characteristics and classification of cyclostomes, Osmoregulation and Parental care and respiratory organs in fishes.
3. General characteristics and classification of amphibian, Metamorphosis in amphibian.
4. Amphibian- Affinities of *Sphenodon*; Poison apparatus and Biting mechanism in snakes.
5. Reptilian characteristics, *Archaeopteryx*.
6. Mammalian characters, Affinities of Prototheria; Adaptive radiation.

ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS THEORY: Zoo-303

On completion of the course, the students will be able to:-

1. Understand the structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue.
2. Structure of neuron, resting membrane potential, Origin of action potential, Reflex action and its types - reflex arc.
3. Histology of testis and ovary; Spermatogenesis and Oogenesis, Reproductive cycle
4. The endocrine glands, Concepts of hormone and hormone receptor and target tissue. Mechanism of hormone action.

FUNDAMENTALS OF BIOCHEMISTRY THEORY-Zoo-305

On completion of the course, the students will be able to:-

1. Know the basic concept on Carbohydrates -Biological importance: Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates, Lipids- saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids.
2. Amino acids: Structure, Classification and General properties of α -amino acids; Introduction to simple and conjugate proteins, Immunoglobulins.

3. Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids
4. Enzymes and their classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics.

COMPARATIVE ANATOMY OF VERTEBRATES THEORY-Zoo-401

On completion of the course, the students will be able to:-

1. Structure, functions and derivatives of integument, Overview of axial and appendicular skeleton, Jaw suspensorium.
2. Digestive System and Respiratory System- Alimentary canal and associated glands, Skin, gills, lungs and air sacs.
3. Circulatory and Urinogenital System -General plan of circulation, evolution of heart and aortic arches, Comparative anatomy of urinogenital ducts.
4. Nervous System and Sense Organs Sense Organs- Comparative account of brain, Autonomic nervous system, Cranial nerves in mammals.

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS THEORY CT-4-Zoo-403

On completion of the course, the students will be able to:-

1. Know about the structural organization and functions of gastrointestinal tract and associated glands, Digestion and Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins.
2. Functional unit of respiration; Mechanism of respiration,
3. Structure of kidney; Mechanism of urine formation; Components of blood, Blood groups: Rh factor and ABO.
4. Structure of mammalian heart; Coronary circulation; Origin and conduction of cardiac impulses Cardiac cycle.

BIOCHEMISTRY OF METABOLIC PROCESSES THEORY: CT-4-Zoo-405

On completion of the course, the students will be able to:-

1. Intermediary cell metabolism, Gluconeogenesis, Glycogenolysis and Glycogenesis
2. β -oxidation and omega -oxidation of saturated fatty acids, Ketogenesis.
3. Amino acids: Transamination, Deamination, Urea cycle.
4. Redox systems; Electron Transport System. ATP as energy currency of cell.

MOLECULAR BIOLOGY THEORY-ZOO-501

On completion of the course, the students will be able to:-

1. Know the Structure of Nucleic acids, Watson and Crick model of DNA.

2. Structure and types of RNA, RNA polymerase and transcription
3. Genetic code, Wobble Hypothesis; Process of protein synthesis in prokaryotes: RNA editing, Processing of tRNA.
4. Principles of transcriptional regulation with examples from *lac* operon and *trp* operon; mismatch repair.

PRINCIPLES OF GENETICS

CT-4-ZOO-503

On completion of the course, the students will be able to:-

1. Know the Mendel's theories of genetics, Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles,
2. Linkage and crossing over, Cytological basis of crossing over, Somatic cell hybridization.
3. Types of gene mutations (Classification), Types of chromosomal aberrations,
4. Criteria for extra-chromosomal inheritance, Mitochondrial mutations in *Saccharomyces*,
5. Polygenic inheritance with suitable examples; simple numericals based on it.
6. Conjugation, Transformation, Transduction, Complementation test in Bacteriophage.

DEVELOPMENTAL BIOLOGY

THEORY-ZOO-601

On completion of the course, the students will be able to:-

1. Cell Differentiation and growth, Differential gene expression.
2. Types of eggs, Egg membranes; Fertilization, Early development of frog and chick upto gastrulation.
3. Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation and Placenta (Structure, types and functions of placenta).
4. Metamorphosis: Changes, hormonal regulations in amphibians and insects.

EVOLUTIONARY BIOLOGY

THEORY- ZOO-603

On completion of the course, the students will be able to:-

1. Concept of Organic evolution, Lamarckism, Darwinism, Neo-Darwinism. Evidences of Evolution: Fossil record.
2. Population genetics: Hardy-Weinberg Law, Evolutionary forces upsetting H-W equilibrium; Natural selection.
3. Micro evolutionary changes, Species concept, Isolating mechanisms.
4. Phylogenetic trees, Multiple sequence alignment, construction of phylogenetic trees, interpretation of trees. Zoogeographic realms.

Program Specific Outcomes

- Demonstrated a broad understanding of animal diversity including knowledge of the scientific classification and evolutionary relationships of major groups of animals.
- Recognized the relationships between structure and functions at different levels of biological organization (e.g., molecules, cells, organs, organisms, populations, and species) for the major groups of animals.
- Characterized the biological, chemical, and physical features of environments (e.g., terrestrial, freshwater, marine, host) that animals inhabit. Explained how animals function and interact with respect to biological, chemical and physical processes in natural and impacted environments.
- Explained how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system. Drawing upon this knowledge, they are able to give specific examples of the physiological adaptations, development, reproduction and behavior of different forms of life.
- Understood the applied biological sciences or economic Zoology such as sericulture, Apiculture, aquaculture, Industrial microbiology, rDNA technology and medicine for their career opportunities.

VISION-To be the most ideal Department in the state in zoological education and research.

MISSION- Create the next generation graduates in Zoology with best of theoretical knowledge, analytical skills, research aptitude, professional ethics and human values.

Career Avenues:

- Career opportunities exist in **teaching** in schools & colleges (after M.Sc.) where any of the science subjects is an important discipline.
- Indian Administrative **Services** and other State and Central Govt. Services where knowledge of science subjects is an advantage.
- Careers in **organizations/industries such as the pharmaceutical** where a high level of competence in Biology is demanded.

ZOO-121

Chordate-I

On completion of the course, students are able to:

1. Understand the phylum Chordate.
2. Understand the basic concepts about chordates.
3. Understand the external morphology and sexual dimorphism in chordates.
4. Study and understand the various systems, adaptation and dentition in Mammals.

ZOO-112

Cell Biology

On completion of the course, students are able to:

1. Understand the Scope of cell biology, because cell is the basic unit of life.
2. Understand the Main distinguishing characters between plant cell and animal cell.
3. To study and understand the whole cell organelles with their structure and function.
4. Understand the cell cycle and know the importance of various cells in body of organisms.
5. Understand the various applications of cells by using cell biology like study of various types of tumour.

