

LEARNING OUTCOMES (DEPARTMENT OF ZOOLOGY)

B.Sc. I Year

DSC1 A *Animal Diversity-Zool 101th (Theory),*

DSE 1B *Comparative Anatomy and Developmental Biology of Vertebrates ZOOLOGY 102 TH (Theory)*

After completing theory course students are able to:

- To understand the Animal Diversity and underlying principles of classification of animals
- To understand the terminology needed in classification
- To understand the differences and similarities in the various aspects of classification.
- To classify invertebrates and vertebrates and to understand the possible group of the invertebrate and vertebrates observed in nature
- To understand how chordates evolved during the course of time by comparing their anatomical features
- To understand developmental biology of the animals

BSc II Year

DSC1C *Physiology and Biochemistry ZOOLOGY 201 TH, DSC1D *Genetics and Evolutionary Biology ZOOLOGY 202 TH**

After successfully completing these courses, students will be able to:

- Define the basic terms in physiology
- To understand enzyme kinetics
- Explain the physiological processes in mammals.
- Define the basic terms in genetics, discuss the linkage groups and gene frequency.
- Explain the concept of mutation
- Explain DNA structure; Paraphrase the Central dogma of molecular biology, understand mechanism of replication, transcription and translation
- To study history of life, theories of evolution, evidences of evolution
- Understand the concept of natural selection, understanding speciation and isolating mechanism

BSc III Year

DSE 1A* *Applied Zoology ZOOLOGY 301 (A) TH OR *Animal Biotechnology ZOOLOGY 301 (B) OR *Aquatic Biology ZOOLOGY 301 (C) TH***

DSE 1B# *Insect, Vector and Diseases ZOOLOGY 302 (A) TH OR *Immunology ZOOLOGY 302 (B) TH OR *Reproductive Biology ZOOLOGY 302 (C) TH***

***Students have opt for one DSE 1A and #one DSE1B.**

After successfully completing these courses,

Applied Zoology students will be able to:

- Understand host-parasite relationship, epidemiology of different diseases, life history of different parasites
- Economically important insects; their biology, damage caused and control, to study about insects of medicinal importance

- Animal husbandry, poultry farming and fish technology

Animal Biotechnology students will be able to understand

- The concept of biotechnology
- Molecular techniques in gene manipulation
- Genetically Modified Organisms
- Animal cell culture and its applications

Aquatic Biology students will be able to understand:

- The concept of Aquatic Biomes
- Lake as an Ecosystem, Lake morphometry, Streams, different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.
- Pollution, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD

Insect, Vectors and Diseases students will be able to understand following concepts after completing this course:

- Morphological features of insects, mouth parts of insects, insects as vectors
- Would learn about mosquito, flea, louse, bugs borne diseases and life histories of these vectors

Immunology students will be able to understand different concepts after completing this course:

- Basic concepts, components , cells and organs of immune system, antigens, haptens, adjuvants, antibodies, monoclonal antibodies, antigen-antibody interactions as tools for research and diagnosis
- Understanding the concepts of MHC, Cytokines, Antigen presentation, Complement System, Gell and Coombs' classification, various types of hypersensitivities, autoimmunity, immunodeficiency and Vaccines

Reproductive Biology students will be able to understand:

- Reproductive endocrinology
- functional anatomy of male and female reproductive systems
- Infertility, causes and management, Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning

Skill Enhancement Courses

These courses are opted by students in 2nd and 3rd year, choosing two courses each per year which are: **1. Medical Diagnostics 2. Apiculture 3 Sericulture 4. Aquarium Fish Keeping OR Research methodology**

B Sc II

ZOOL 203 TH Medical Diagnostics students after completing the course successfully will be able to understand:

- Diagnostics methods for blood and urine analysis

- Non -infectious Diseases; Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

ZOOL 204 TH Apiculture students will be able to understand:

- Biology of bees, rearing of bees, Diseases and enemies of bees and control measures
- Bee economy and entrepreneurship in Apiculture

BSc III

ZOOL 303 TH Sericulture students will be able to:

- Explain Silk Route, races of silkworm, Mulberry and non-mulberry sericulture
- Understand and explain the biology and rearing of silk moth, pests and diseases of silkworm,
- Understand entrepreneurship in sericulture

ZOOL 304 (A) TH Aquarium Fish Keeping students will be able to understand and explain following concepts after completing the course:

- Scope of Aquarium Fish Industry as a Cottage Industry, Exotic and
- Endemic species of Aquarium Fishes
- Biology of some marine and freshwater aquarium fishes, food and feeding, transportation of fishes
- General Aquarium maintenance– budget for setting up an Aquarium Fish Farm as a Cottage Industry

OR

ZOOL 304 (B)TH Research Methodology students will be able to explain and understand:

- Meaning, Objectives of research, Research Methods vs Methodology, Types of Research; Analytical vs Descriptive, Quantitative vs Qualitative, Basic vs Applied Research
- Research Design, Data Collection, Analysis and Report Writing
- Intellectual property Rights, Commercialization, Copyright, Royalty, Patent law,
- Plagiarism, Citation, Acknowledgement

Practical Courses in BSc I, II and III Year (Courses: DSC1A, DCS1B, DSC1C, DSC1D, DSEIA and DSE1B)

After completing all the practical courses, the students will be able to perform/analyse/identify/understand:

- First-hand knowledge about identification of non-chordate and chordate specimens (fresh and preserved) along with larval forms and study of endoskeleton of vertebrates
- Histology of different tissues (mammalian) through permanent slides
- Qualitative analysis of carbohydrates, quantitative estimation of proteins (Lowery's method), salivary amylase activity
- Mendelian and non-Mendelian inheritance, human karyotype, fossil evidences, phylogeny of horse
- Various pathogens through permanent slides, vectors through slides/specimens

- The method of genomic isolation, restriction digestion of plasmid DNA, Construction of circular and linear restriction map from the data provided, DNA fingerprinting
- The amount of Turbidity/transparency, Dissolved Oxygen, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body
- Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler)
- Macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem/ through specimens or slides
- Identify different kinds of mouth parts of insects through permanent slides/photographs
- To identify different diseases transmitted by insect vectors through samples/ preserved specimens
- Histological study of spleen, thymus and lymph nodes through slides/ photographs
- Preparation of stained blood film to study various types of blood cells, ABO blood group determination, ELISA and Immunoelectrophoresis
- Study of animal house, study of testis, epididymis and accessory glands of male reproductive systems, Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina through permanent slides
- Surgical techniques: principles of surgery in endocrinology. Ovaryectomy, hysterectomy, castration and vasectomy in rats