

## LEARNING OUTCOMES (DEPARTMENT OF ZOOLOGY)

### B. Sc. I Year

**DSCE 1 A *Animal Diversity-ZOOL 101TH (Theory),***

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

**After completing theory course students are able to:**

- Understand the diversity of animals and the basic principles of animal classification
- Understand the terminology used in classification
- Understand the differences and similarities in various aspects of classification.
- Classification of invertebrates and vertebrates and understanding of the possible group of invertebrates and vertebrates observed in nature
- Understand the evolution of chordates over time by comparing their anatomical features
- Understand the biology of animal development

### BSc II Year

**DSCIC *Physiology and Biochemistry ZOOL 201 TH, DSC1D *Genetics and Evolutionary Biology ZOOL 202 TH****

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

- Define basic concepts of physiology
- Understand enzyme kinetics
- Explain physiological processes in mammals.
- Define basic concepts of genetics; discuss linkage groups and gene frequencies.
- Explain the concept of mutation
- Explain the structure of DNA; Paraphrase the central dogma of molecular biology, understand the mechanism of replication, transcription and translation
- Study the history of life, theories of evolution, evidence of evolution
- Understand the concept of natural selection, understand the mechanism of speciation and isolation

### BSc III Year

**DSE IA\* *Applied Zoology ZOOL 301 (A) TH OR Animal Biotechnology ZOOL 301 (B) OR Aquatic Biology ZOOL 301 (C) TH***

**DSE IB *Insect, Vector and Diseases ZOOL 302 (A) TH OR Immunology ZOOL 302 (B) TH OR Reproductive Biology ZOOL 302 (C) TH***

**\*Students have to opt for one DSE 1A and DSE 1B.**

After successfully completing these courses,

**Applied Zoology** students will be able to:

- Understand host-parasite relationships, epidemiology of various diseases, life cycle of various parasites

- Insects of economic importance; their biology, damage and control to study insects of medical interest
- Livestock/Animal husbandry, Poultry and Fish Technologies

**Animal biotechnology** students will be able to understand

- Concept of biotechnology
- Molecular techniques in genetic manipulation
- Genetically modified organisms
- Animal Cell culture and its Applications

**Aquatic Biology** student understands:

- The concept of aquatic biomes
- The lake as an ecosystem, morphometry of lake, streams, the different stages of development of streams, physico-chemical environment, adaptation of mountain fish.
- Pollution, Management and Conservation (Legislation), sewage water treatment, water quality assessment - BOD and COD

**Insects, Vectors and Diseases** Upon completion of this course, students will be able to understand the following concepts:

- Insect morphology, insect mouth parts and insect vectors
- Would learn about diseases transmitted by mosquitoes, fleas, lice, insects and the life histories of these vectors

**Immunology** students will be able to understand several concepts:

- Basic concepts, components, cells and organs of the immune system, antigens, haptens, adjuvants, antibodies, monoclonal antibodies, antigen-antibody interactions as tools for research and diagnosis of immunodeficiency and vaccines
- 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 the Male and Female Reproductive System.
- Infertility, causes and treatment, assisted reproduction techniques: 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 2<sup>nd</sup> and 3<sup>rd</sup> year, choosing two courses each per year which are: *1. Medical Diagnostics 2. Apiculture 3. Sericulture 4. Aquarium Fish Keeping OR Research methodology*

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

- Diagnostic methods for analysis of blood and urine
- Non communicable diseases; Diabetes (type I and II), high blood pressure (primary and secondary), blood glucose measurement with glucometer/kit

**ZOOL 204 TH Apiculture** students can understand:

- Biology of bees, beekeeping, diseases and enemies of bees and control measures
- Bee-economy and entrepreneurship

### **BSc III**

**ZOOL 303 TH Sericulture** students will understand

- The Silk route, silkworm breeds, mulberry and non-mulberry cultivation
- Understand and explain the biology and breeding of the silkworm moth, silkworm pests and diseases.
- Understand entrepreneurship in sericulture

**ZOOL 304 (A) TH Aquarium fish keeping** students can understand and explain the 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 can explain and understand:

- Meaning, research goals, research methods versus methodology, types of research; Analysis 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 of identifying concordant preparations and concordances (fresh and preserved) with larval forms and study of the endoskeleton of vertebrates
- Histology of various tissues (mammalian) with stable preparations
- Qualitative analysis of carbohydrates, quantitative evaluation of proteins (Lowery method), saliva -Amylase activity

- Mendelian and non-Mendelian inheritance, human karyotype, fossil evidence, equine phylogeny
- Various pathogens for stable preparations, vectors for preparations/specimens linear restriction maps based on provided data DNA fingerprinting
- Amount of turbidity/transparency, solute Oxygen, alkalinity (carbonates and bicarbonates) in water collected from a nearby lake/body
- Instruments used in limnology (Secchi disc, Van Dorn bottle, conductivity meter, turbidimeter, sampler clamp y PONAR)
- Macrophytes, phytoplankton and zooplankton in the lake ecosystem/by specimens or preparations
- Identification of different species of insect mouthparts by permanent slides/photographs
- Identification of different vector insect diseases by stored specimens/preparations
- Examination of the histology of the spleen, thymus and lymph nodes by preparations/photographs
- Preparation of stained blood smears for examination of different blood cell types, AB0 - Blood group, ELISA and immune-electrophoresis
- 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 experimental animals (rats).

**Submitted by:**

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**HOD**

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