



THIRD SEMESTER
COURSE: MINOR
PHYSIOLOGY AND BIOCHEMISTRY
PAPER: MIN-ZOO – 3.2
CREDIT POINT: 04(3 Theory + 1 Practical)

Course Objectives

- To impart an understanding of the fundamental physiological and biochemical processes in animals.
- To provide insights into organ systems, their regulation, and their biochemical underpinnings.
- To prepare students for advanced studies in animal physiology, biochemistry, and related fields.

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- Explain the physiological basis of digestion, respiration, excretion, circulation, nerve conduction, muscle contraction, reproduction, and endocrinology.
- Describe major biochemical pathways and enzyme functions.
- Apply core concepts of physiology and biochemistry in zoological research and real-world contexts

Theory(3 credits)

Unit 1: Digestion and Respiration

1. Physiology of digestion in the alimentary canal
2. Absorption of carbohydrates, proteins, and lipids
3. Pulmonary ventilation; respiratory volumes and capacities
4. Transport of oxygen and carbon dioxide in blood

Unit 2: Excretion and Cardiovascular System

1. Structure of nephron; mechanism of urine formation
2. Counter-current mechanism
3. Composition of blood; haemostasis
4. Structure of heart; origin and conduction of cardiac impulse
5. Cardiac cycle

Unit 3: Reproduction and Endocrine Glands

1. Physiology of male reproduction: spermatogenesis
2. Physiology of female reproduction: oogenesis, menstrual cycle, hormonal control
3. Structure and function of pituitary, thyroid, parathyroid, pancreas, and adrenal glands

Unit 4: Nerve and Muscle

1. Resting membrane potential; graded potential; action potential: properties, origin, and conduction (myelinated and non-myelinated fibers)
2. Mechanism of synaptic transmission
3. Mechanism of skeletal muscle contraction

Unit 5: Enzymes and Metabolism

1. Enzyme classification and nomenclature; mechanism of action; enzyme kinetics
2. Glycolysis; Krebs cycle; pentose phosphate pathway; electron transport chain
3. β -oxidation of fatty acids; transamination; deamination; urea cycle

Practicals (1 Credit)

- Demonstration of enzyme activity (e.g., salivary amylase).
- Determination of haemoglobin content.
- Measurement of blood pressure and pulse rate.
- Study of permanent slides/models of various physiological systems.
- Experiments on muscle and nerve physiology (demonstration based).
- Urine analysis for urea, sugar, and chloride.

Suggested Readings

- **Ganong's Review of Medical Physiology**, Kim E. Barrett et al. (26th Ed., McGraw-Hill Education, 2019)
- **Textbook of Medical Physiology**, Guyton & Hall (12th Ed., Harcourt Asia/W.B. Saunders)
- **Biochemistry**, J.M. Berg, J.L. Tymoczko & L. Stryer (6th Ed., W.H. Freeman)
- **Lehninger Principles of Biochemistry**, Nelson & Cox (4th Ed., W.H. Freeman)
- **Harper's Illustrated Biochemistry**, R.K. Murray et al. (28th Ed., McGraw-Hill)

B.Sc. 4th Semester

MINOR

Paper: ZOO-MIN-4.2

ANIMAL TAXONOMY AND SYSTEMATICS

Course Outcome:

- 1 . Explain fundamental principles and philosophies of taxonomy and systematics.
- 2 . Apply modern classification techniques including molecular taxonomy and species concepts.
- 3 . Perform scientific preservation and identification using taxonomic keys.
- 4 . Integrate field and lab-based methods for biological data collection and analysis.

Theory

Credits 3

Unit 1- Taxonomy and systematics.

Taxonomy: Introduction, traditional and cladistic taxonomy, stages of taxonomy.

Systematic: Introduction, derivation of term, relationship between taxonomy and systematic.

Newer aspects of Taxonomy: Cytotaxonomy, Chemotaxonomy , molecular taxonomy.

Unit 2: Zoological classification:

Biological classification, need of classification, advantage of classification, systems of classification: classical taxonomy, artificial taxonomy, natural system of classification. evolutionary classification. Species concept: Nominalistic species concept, typological species concept, phenetic species concept, biological species concept, evolutionary species concept.

Unit 3: Taxonomic collection:

Importance of collection, method for collecting invertebrates: method for terrestrial habitats, methods for aquatic habitats, Methods for collecting chordates: lower chordates, pisces, amphibian and reptiles, aves, mammalian.

Unit 4: Preservation techniques and identification:

Fixation and preservation. Preservation for invertebrates: invertebrates killing methods, dry methods of preservation, wet methods of preservation, Preservation of chordates: lower chordates, fish preservation, amphibian , reptiles, bird and mammalian preservation techniques. Identification methods, taxonomic key.

Unit 5: Zoological nomenclature:

ICZN: Basic concepts, important rule, Historical background of the code. Binomial nomenclature: history, rule of the system, trinomial nomenclature.

Suggested Readings

1. Principles of Animal Taxonomy – Ernst Mayr
2. Systematics and Evolution: Principles and Practice – R. L. F. DeSalle & B. S. L. Seibert
3. Animal Classification and Phylogeny – Richard L. Gregory
4. An Introduction to Animal Systematics – G.G. Simpson

PRACTICALS:

credit 1

1. Morphometry and meristic study of insect and fish.
2. Identification of distinguish species of insects/ fishes/ amphibian/ reptiles/ birds/ mammals using appropriate taxonomic keys.
3. Preparation, mounting and stuffing of fishes.
4. Collection and preservation of insects using appropriate methods.
5. Field visit to any natural history museum/ Zoo/ National park and preparation of scientific report and submission.