

Course Objectives:**Knowledge**

At the end of the course the student will be able to:

1. Understand on the molecular and cellular mechanisms of physiological function as the basis of unity in diverse animals e.g. membrane excitability, exchange of respiratory gases, removal of nitrogenous wastes tissue, osmotic and organ physiological mechanisms underlying animal homeostasis and temperature effects.
2. Grasp the development of performing the function developed at molecular and cellular level in the complexity of the animals such as chemical & nervous integration, respiratory and excretory functions.
3. Know the strategy acquired to perform the functions in diverse environment such as in dry, aquatic cold and hot at molecular and cellular level and regulations to achieve strategy by chemical and nervous regulation at organ levels.
4. Comprehend the concepts in homeostasis and integration in sustaining the life in constantly changing conditions.

Skills:

At the end of the course the student will be able to:

1. Perform experiments designed either primarily for the study of physiological phenomena or for assessment of function.
2. Analyze and interpret experimental/investigative data critically in performance of functions in changed conditions.
3. Distinguish between normal and failure of the function in abnormal conditions even through results of experiments/data collections also by the students in laboratory and fields.

Course Learning Outcomes:

Following the completion of this course, each student should have:

1. **An understanding** of critical concepts, processes, and factual information in the performance of functions and changing conditions.
2. **A knowledge** of resources for finding the solution for strategies to sustain diverse forms of animal life kept and in wild in normal and abnormal conditions.
3. **The ability** to utilize knowledge of animal physiology in critical study and for making intelligent decisions in professional life.

Theory:**Concept of Physiology**

1. Principles of Homeostasis and conformity
2. Principles of regulation and adaptation

Membrane Physiology:

1. Ionic distribution across membrane
2. Resting membrane potentials: Electrogenic ion pump, Donnan equilibrium, Ion channels.

Nerve and Muscle Physiology:

1. Action potentials in neurons
2. Electrical and chemical synaptic transmission
3. Neurotransmitters in communications
4. Receptors of neurotransmitters in diverse physiological responses
5. Excitatory and inhibitory postsynaptic potentials
6. Neuronal networks and their role in nervous integration
7. Muscles: Structure, types, components, muscle proteins
8. Molecular basis of muscle contraction
9. Sarcoplasmic reticulum and role of calcium
10. Neuromuscular interaction at cell and molecular level muscle
11. Types of muscle contractions and muscle fatigue.

Endocrine Physiology:

1. Hormones of invertebrates and specifically of arthropods for the functions in their modes of life.
2. Hormones of various vertebrates' endocrine organs and comparison of their roles in adaptability of mode of life.
3. Mechanisms of hormone actions, hormone receptors, signal transduction and hormonal coordination.

Cardiovascular Physiology:

1. Electrical activity of heart; self-excitability and auto-rhythmicity of myogenic heart.
2. Neurogenic heart and their expression.
3. Electrocardiography and Kymography.
4. Hemodynamics, Relationship between blood flow, Pressure and Resistance. Their role in performance of the function in variety of vertebrates.
5. Control of cardiac activity, cardiac output and peripheral circulation.

Respiratory Physiology:

1. Mechanism of respiratory gases exchange in aquatic and terrestrial respiratory structures.
2. Control of respiration and stimulus factors in various animals.
3. Respiration adaptations in hypoxia and percapnia etc.
4. Air breathing and respiratory adaptations diver animals.

Excretory Physiology:

1. Strategy of mammalian large glomerular filtration and re-absorption in nitrogenous excretion.
2. Patterns of nitrogenous excretion in various animals and their phylogenetic significance.

Physiology of Nutrition:

1. Adaptation of nutritive canal for digestion and absorption of nutrients in different animals specifically the vertebrates.
2. Regulation of digestive secretions.
3. Mechanisms of water, ions and nutrients absorptions and their significances in diverse groups.
4. Potential and Movements in gastrointestinal tract and control of motility.

Practicals:

Respiration and Circulation

- Study of respiratory pigments in various animals and haemoglobins in various vertebrates.
- Normal cardiac activity in amphibian model, effect of temperature, effect of drug, heart block, tetanization of heart.
- Measurement and effects of various factors on blood pressure. Blood pressure alteration in exercise.
- Oxygen consumption in fish and effect of temperature (by dissolved oxygen meter) and terrestrial animal (mouse). Oxygen consumption (by respirometer),

Nerve and Muscle

- Study of salient features of electromyography
- Study of excitable and contractile properties of a nerve-muscle preparation.

Nervous System:

- Study of brains in different animals in relation to complexity of functions.
- Study of human brain model and different areas eliciting behaviours.
- Videos study on 1 and 2 studies.

Hormones System:

- Video studies on the effects of hormones in breeding season behaviours of various behaviours.
- Study through clinics data on the insulin and glycemia in type1 and type 2 diabetic subjects.

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos/films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Text/Reference Books:

1. Principles of Animal Physiology Third Edition
Moyes, Christopher D. Schulte, Patricia M. Publisher: Pearson; 3 edition, 2015.
2. Eckert Animal Physiology Fifth Edition
David Randall, Warren Burggren, Kathleen French W. H. Freeman; 2001.
3. Animal Physiology: From Genes to Organisms 2nd Edition
Lauralee Sherwood, Hillar Klandorf, Paul Yancey Brooks Cole; 2012.
4. Animal Physiology 4th Edition Richard W. Hill, Gordon A. Wyse, Margaret Anderson Sinauer Associates, Oxford University Press, 2016