KU3DSCZOO201: ANIMAL PHYSIOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC	200	KU3DSCZOO201	3+1	60

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/Tutorial	Practical	CE	ESE	Total	
3	2	25	75	100	1.5

Course Description:

This course explores the physiological processes of animals, including nutrition, respiration, circulation, excretion, nerve function, and muscle activity. Through theoretical study and practical application, students gain insight into how animals maintain homeostasis and adapt to diverse environments.

Course Prerequisite:

Course Outcomes:

	Expected Outcome	**Learning Domains**
CO1	Identify and explain the basic physiological processes that allow animals to survive in different habitats	U
CO2	Apply the scientific method to studies of animal physiology by conceiving and designing an experimental approach for studying specific physiological processes	A
CO3	Improve scientific literacy by critically evaluating scientific literature and articulating the key questions, hypotheses, methods, results, and conclusions	An
CO4	Evaluate and compare different approaches for applying physiological principles to practical applications in the lab and field to answer physiological questions	E
CO5	Connect physiological principles to other scientific disciplines (e.g., ecology, behaviour, morphology)	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5
CO1	1	0	3	2	3
CO2	0	0	2	1	2
CO3	0	1	3	3	1
CO4	1	1	3	3	1
CO5	0	0	3	3	1

COURSE CONTENTS

Module I: Neurotransmission Physiology and Physiology of Motility (13 hours)

Unit I

Membrane physiology

1.1 Functional consequences of molecular composition and arrangement (Gibbs Donnan Equilibrium).

1.2 Transport across cell membrane- Diffusion, active transport, ionic pump (Na-K pump, Calcium channel); uniports, symports and antiport, co-transport by symporters and antiporters.

Unit II

Physiology of neuronal system

1.3 Membranes potential

1.4 Propagation of action potential across the myelinated and non-myelinated nerve fibres, All or none law, Summation. Synaptic transmission

1.5 Electrical transmission, Chemical transmission, Mixed transmission

1.6 Neurotransmitters (eg. Acetylcholine, Adrenaline, GABA, Dopamine, Serotonin, Glycine)

Unit III

1.7 Neuromuscular junction

1.8 Biochemistry of contractile proteins

1.9 Physiology of skeletal muscle

a) Actomyosin complex

b) Source of energy for muscle contraction - Cori Cycle

c) Sliding filament theory

d) Excitation- Contraction Coupling, Role of Calcium

e) Mechanism of relaxation

Module II: Physiology of Respiration and Circulation (12 hours)

Unit I

2.1 Physiological anatomy and histology of respiratory passage and lungs

2.2 Mechanism of pulmonary ventilation (inspiration & expiration)

2.3 Alveolar ventilation, dead space and its effect on alveolar ventilation

2.4 Role of surfactant in alveolar expansion

2.5 Pulmonary volumes and capacities

2.6 Transport of oxygen and carbon dioxide (Haldane Effect and Bohr Effect)

2.7 Oxygen dissociation curve

2.8 Neural and chemical regulation of respiration

Unit II

2.9 Structure of human heart

2.10 Pacemaker and specialized conducting fibres

2.11 Cardiac cycle

2.12 ECG – Principle and application

2.13 Neuro hormonal regulation of cardiac amplitude and frequency (Acetylcholine and Adrenaline)

Unit III

2.14 Blood clotting mechanism (Extrinsic and Intrinsic Pathway), Anticoagulants.

2.15 Lymph channels of the body

2.16 Composition and formation of lymph

2.17 Functions of lymph and lymphatic system

Module III: Nutritional Physiology (10 hours)

Unit I

3.1 Constituents of normal diet and their daily requirements, balanced diet: A human perspective; Malnutrition (PEM, Obesity)

3.2 Digestion of carbohydrate, protein & lipids– role of salivary glands, liver, pancreas and intestinal glands in digestion (Brief description of structure of glands expected).

Unit II

3.3 Absorption of carbohydrates, lipids, amino acids, water, electrolytes, vitamins and minerals in GIT

Unit III

3.4 Movements in GI tract (Brief description of histology is expected).

3.5 Bulk movement, peristalsis and defecation

3.6 The role of hormones (Gastrin, Enterogastrin, Cholecystokinin and Serotonin) and neurotransmitters (Acetylcholine and Adrenaline) in digestion and gastrointestinal motility

Module IV: Physiology of Excretion (10 hours)

Unit I

4.1 Components (normal & abnormal) and characteristics of urine

4.2 Urine formation (glomerular filtration, tubular reabsorption and tubular secretion)

Unit II

4.3 Mechanism of concentration of urine – Counter current system (counter current multiplier and counter current exchanger)

4.4 Ornithine Cycle

Unit III

4.5 Hormonal control of urine formation

4.6 Renal regulation of acid base balance

4.7 Physiology of micturition

Module V: Practicals (30 hours)

1. Qualitative tests for identification of ammonia, urea and uric acid (nitrogenous excretory products)
2. Study of permanent histological sections of mammalian endocrine glands - pituitary, thyroid, pancreas, adrenal gland.
3. Estimation of haemoglobin using Sahlis Haemoglobinometer.
4. Differential count of WBC using Haemocytometer.
5. Total RBC Count using Haemocytometer
6. Human Blood Smear preparation

Teacher Specific Module	**9 Hours**
Directions: **20 percent of the experiments can be modified by the course teacher** *Suggestion:* 1. Effect of pH and Temperature on salivary amylase activity. 2. Estimation of total protein by Lowry's method.	

Essential Reading:

1. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

References:

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill
3. Hoar, W.S. (1983). General and Comparative Physiology, Prentice Hall.
4. Prosser, C.L. (1978). Comparative Animal Physiology. W.B. Saunders co.
5. Schmidt Nielsen, K. (1994). Animal Physiology: Adaptation and Environment. Cambridge University Press

Suggested Readings:

1. Neuroscience: Exploring the Brain" by Mark F. Bear et al.
2. "Principles of Neural Science" by Eric R. Kandel et al

Assessment Rubrics:

Evaluation Type		**Marks**	
		Theory	**Practical**
• End Semester Evaluation		50	15
• Continuous Evaluation		25	10
Continuous Evaluation			
Theory/Practical	Method of Assessment	Marks	
Theory			
a)	Test paper I	5	
b)	Test paper II	5	
c)	Viva-Voce/Seminar/ Discussion	10	
d)	Assignment	5	
		Total – 25 marks	
Practical			
a)	Regularity/Punctuality	5	
b)	Laboratory skill	5	
		Total – 10 marks	