

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY**  
**AND BIOTECHNOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

**SEMESTER - V**

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
321C5A	<b>ANIMALPHYSIOLOGY AND BIOCHEMISTRY</b>	Core	Y	-	-	-	5	5	25	75	100
<b>Learning Objectives</b>											
CO1	To familiarise students with the principles and basic facts of Animal Physiology.										
CO2	To give students an insight about the molecular and cellular basis of physiological functions in animals.										
CO3	To give an idea about the regulation of organ system functions in a whole animal using a conceptual model of feedback to explain homeostasis.										
CO4	To make the students aware about how the structure-function relationships and its synchronisation with the molecular signals.										
CO5	To help students gain knowledge in the basic structure of carbohydrates, fats and proteins and to understand the role of biomolecules in metabolism and learn the metabolic pathway										
UNIT	Details							No. of Hours	Course Objectives		
I	<b>Nutrition</b> – Nutrients – Carbohydrates, proteins, fats, minerals, and vitamins. Digestive enzymes and their role in digestion – absorption and assimilation. <b>Respiration</b> -Respiratory organs - Respiratory Pigments and functions - Transport of gases-Respiratory quotient-BMR.- Bronchitis,Asthma –Physiological effects of smoking. <b>Circulation</b> -Types- Properties and Function of Blood – Coagulation of blood-Types of heart – Cardiac Cycle - Regulation of heart Beat - ECG-Myocardial infarction , stroke – Blood Pressure.							15	CO1		
II	<b>Excretion</b> - Excretory organs – kinds of excretory products – Mechanism of urine formation in mammals-hormonal regulation of excretion- Kidney failure and dialysis. <b>Osmo-ionic regulation</b> - Osmo-ionic regulation in aquatic and terrestrial animals.Bioluminescence <b>Thermoregulation</b> -Temperature regulation in poikilotherms and homeotherms –physiology of hibernation-aestivation.							15	CO2		

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III	<p><b>Neuromuscular Co-ordination</b> – Neuron – Structure, types of neurons-Nerve impulse – Synaptic transmission – Neurotransmitters. Reflex action, Nerve disorders – epilepsy, Alzheimer’s disease, Parkinson’s disease.</p> <p><b>Muscles</b> –Structure and Types of muscles –Physiological properties of muscle contraction- Biochemical events of muscle contraction.</p>	15	CO3
IV	<p><b>Endocrine glands</b>- structure, secretions and functions of endocrine glands of vertebrates, Feed-back mechanism – Pituitary,Thyroid, Parathyroid, Adrenal, Thymus, Islets of langerhans, Ovary and testis.</p> <p><b>Receptors</b> – Chemoreceptors - Photoreceptor – mammalian eye – visual pigments – physiology of vision – phonoreceptors – mammalian Ear- Organ of Corti – working mechanism- - equilibrium receptors.</p>	15	CO4
V	<p><b>Biochemistry</b>-Definition and scope -biological importance,classification and structure of Carbohydrate,Proteins andL ipids.Metabolism-metabolic pathways with reference to carbohydrates ,proteins &amp; lipids .</p> <p>Glycogenesis – Glycogenolysis – Gluconeogenesis – Glycolysis–Kreb’s Cycle Oxidative phosphorylation – Cori cycle .Electron transport system - Deamination– Transamination – Beta oxidation of fatty acids .</p> <p>Enzymes – properties and classification, mechanism of enzyme action, enzyme kinetics.</p>	15	CO5
<b>Total</b>		<b>75</b>	
<b>Course Outcomes</b>			
<b>Course Outcomes</b>	On completion of this course, students will;		
<b>CO1</b>	Be able to explain how the various organ systems are coordinated and controlled.		PO1
<b>CO2</b>	Be able to list the functions of various organs in relation to physiological process.		PO1, PO4
<b>CO3</b>	Be able to develop the idea of multi level controlling and feed back mechanism in relation to various physiological functions.		PO4, PO6
<b>CO4</b>	Be able to understand the basic physiological process related to adaptation, metabolism and major requirements.		PO4, PO5, PO6
<b>CO5</b>	Be able to gain knowledge in the basic structure of carbohydrates, fats and proteins and to understand the role of biomolecules in metabolism and learn the metabolic pathway		PO3, PO8

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<b>Text Books</b> <b>(Latest Editions)</b>	
1.	Agarwal R A., Anil K Srivastava., Kaushal Kumar.,1978. Animal Physiology and Biochemistry, S. Chand & Co. Ltd., New Delhi Publishing., 377 pp.
2.	Ambika Shanmugam, 2001. Fundamentals of Biochemistry for Medical students, Karthik Offset Printers, Chennai, 590pp
3.	Berry A.K.1998. A text book of Animal Physiology and Biochemistry. Emkay Publications, New Delhi, 320 pp.
4.	Parameswaran, Ananta krishnan and Ananta Subramanian, 1975. Outlines of Animal Physiology, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 329 p p.
5.	Verma P.S., Tyagi B.S & Agarwal V.K., 2010. Animal Physiology, S. Chand & Co. Ltd., New Delhi Publishing., 417 pp.
6	Nelson, D.L. & Cox,M.M. (2017) Lehninger principles of Biochemistry (7 <sup>th</sup> edition), W.H. Freeman and Co., New York.
7	Berg,J.M.;Tymoczko,J.L. and Stryer,L. (2012) biochemistry (7 <sup>th</sup> edition) Freeman.
<b>References Books</b> <b>(Latest editions, and the style as given below must be strictly adhered to)</b>	
1.	Guyton, A.C. and Hall, J.B., 2011. Text Book of Medical Physiology, 9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore., 1064 pp.
	Ganong, W.F., 2019. Review of Medical Physiology, McGraw Hill, New Delhi., 340 pp.
	Hill, W.R., Wyse, G.A and Anderson, M. 2016. Animal Physiology (4thedn). Sinauer Associates is an imprint of Oxford University Press; USA, 828 pp.
2.	Hoar, W.S. 1983. General and Comparative Physiology. Prentice Hall of India, New Delhi, 928 pp.
3.	Prosser C.L., 1985. Comparative Animal Physiology, Satish Book Enterprise, Agra - 282 003, 966 pp.
4.	Sarada Subrahmanyam, Madhavan Kutty, K., & Singh H.D., 2018. Text Book of Human Physiology, S. Chand & Co, New Delhi.
5.	Singh, H.R and Kumar, N. 2017. Animal physiology and biochemistry, Vishal publishing company, Jalandhar, 864 pp.
6.	Sreekumar, S. 2010. Basic physiology, PHI learning private ltd., New Delhi.210 pp
7.	Tortora G.J. & Derrickson B., 2016. Principles of Anatomy and Physiology, John Sons, Inc. 1232 pp.
8	Wood, D.W., 1968. Principles of Animal Physiology, Edward Arnold Ltd,

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	London., 342 pp.	
9	Zubay,G. (2017) Biochemistry (4 <sup>th</sup> edition)McGraw-Hill.	
10	Jain,J.L.(2001) Fundamentals of Biochemistry, Chandra &CO. Pvt.Ltd. New Delhi.	
<b>Web Resources</b>		
1.	<a href="https://microbenotes.com/category/biochemistry/">https://microbenotes.com/category/biochemistry/</a>	
2.	<a href="https://www.stem.org.uk/resources/collection/3931/animal-physiology">https://www.stem.org.uk/resources/collection/3931/animal-physiology</a>	
3.	<a href="https://animalphys4e.sinauer.com">https://animalphys4e.sinauer.com</a>	
4.	<a href="https://nptel.ac.in/courses/102/104/102104042/">https://nptel.ac.in/courses/102/104/102104042/</a>	
5.	<a href="https://biochem.oregonstate.edu">https://biochem.oregonstate.edu</a>	
<b>Methods of Evaluation</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	
	Total	
	25 Marks	
	75 Marks	
	100 Marks	
<b>Methods of Assessment</b>		
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions	
<b>Understand/Comprehended (K2)</b>	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
<b>Application (K3)</b>	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
<b>Analyze (K4)</b>	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
<b>Evaluate (K5)</b>	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
<b>Create (K6)</b>	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

**Mapping with Programme Outcomes:**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	M						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong(3)

M-Medium (2)

L-Low (1)