

Semester III**Name of the Programme: M. Sc. Zoology****Course Code: ZOO-600****Title of the Course: Neurophysiology (Theory)****Number of Credits: 03****Effective from AY: 2023-24**

Pre-requisites for the Course:	Basic working knowledge of the Nervous system. Parallel enrolment for the courses ZOO-602 Neurophysiology (Practicals)	
Course Objectives:	<ol style="list-style-type: none">1. To review the gross and microanatomy of the nervous system to examine the blood-brain barrier, neuro circuits, and types of synaptic transmission.2. To examine electrophysiological techniques for the acquisition of data and to compare the electrophysiology of impulse conduction in various nerve fibers.3. To inspect the neurophysiological aspect of learning, memory formation, sensation, sleep, posture, and balance.	
Content:	Module 1 Review of classification of neurons and their functions. Blood-brain barrier and its physiological importance, CSF composition, formation, and drainage.	4 hours
	Physiological characteristics of neuronal cell membrane components for impulse conduction.	2 hours
	Myelin ultrastructure and Nodes of Ranvier, nerve impulse conduction in myelinated and unmyelinated neurons.	4 hours
	Electrophysiology of neurons. Comparison of action potentials of giant axon of Squid and mammalian neuron.	3 hours
	Voltage and Cell-Patch Clamp Techniques.	2 hours
	Module 2 Types of synaptic connections (axosomatic, axodendritic, dendro-dendritic, and axo-axonal synapses). Properties of Synapse. The basic concept of Neural integration: Diverging, Converging, and Reverberating circuits.	2 hours
	Chemical and electrical synapses and their transmission	4 hours

	<p>physiology. Axonal impulse conduction-excitatory and inhibitory synaptic transmission.</p> <p>Neurotransmitters, Neuropeptides, and receptors.</p> <p>Steps involved in synthesizing, transporting, and releasing neurotransmitters and neuropeptides.</p> <p>Synthesis and release of Acetylcholine, Glutamate, GABA, Dopamine, Norepinephrine, and Epinephrine, Serotonin, Nitric oxide.</p> <p>Module 3</p> <p>Learning and Memory types and its Neural and Cellular basis in Aplysia, Drosophila, Honey bee, and Humans.</p> <p>Neurophysiology of Avian song/ call formation.</p> <p>Cognition and its major domains. Mechanoreception, Photoreception, Chemoreception.</p> <p>Neurophysiology of balance and posture.</p> <p>Neurophysiology of sleep.</p>	<p>2 hours</p> <p>2 hours</p> <p>5 hours</p> <p>4 hours</p> <p>4 hours</p> <p>2 hours</p> <p>3 hours</p> <p>2 hours</p>
Pedagogy:	Lectures/ Presentations/ Assignments/ Self-study/ Discussion	
References/ Readings:	<ol style="list-style-type: none"> 1. B. Scott, G. Siegel, R. W. Albers, and D. L. Price, Eds., Basic Neurochemistry: Principles of Molecular, Cellular, and Medical Neurobiology. Academic Press, 2011. 2. C. Hammond, Cellular and Molecular Neurophysiology. Academic Press, 2008. 3. R. Carpenter and B. Reddi, Neurophysiology: A Conceptual Approach, Hodder and Arnold. UK, 2012. 4. D. Purves, G. J. Augustine, D. Fitzpatrick, L. C. Kartz, A. S. LaMantia, J. O. McNamara and S. M. Williams, Eds., Neuroscience. Oxford University Press, 2018. 5. R. Menzel and P. Benjamin, Eds., Invertebrate Learning and Memory, Academic Press, 2013. 6. D. Poeppel, G. Mangun and M. S. Gazzaniga, Eds., The Cognitive Neurosciences. A Bradford Book the MIT Press Cambridge, 	

	Massachusetts London, England, 2009.
Course Outcomes:	<p>The learner will</p> <ol style="list-style-type: none"> 1. Appraise and justify the importance of the molecular setup of the nervous system cells to bring about neurotransmission. 2. To predict and justify the neurophysiological changes during pathological alterations in neuronal functioning. 3. To elaborate on the understanding of neurophysiological aspects of learning and memory. 4. To elaborate on the functional aspects of sleep, sensation, and balance.