TEACHING PLAN: Mammalian Physiology-II

SCHOOL: SCHOOL OF BASIC & APPLIED SCIENCES (SOBAS), RAFFLES UNIVERSITY			
ACADEMIC SESSION: 2022 – 2025		FOR STUDENT'S BATCH: B.Sc. (CBZ) II Year (IV-Semester)	
1	**Course No.**	ZOO – 204	
2	**Course Title**	Mammalian Physiology-II	
	Credits	**3**	
4	**Learning Hours**	**Contact Hours**	**38**
		Assessment	**22**
		Guided Study	**30**
		Total hours	**90**
		3 lectures per week	

5	**Course Objective**	1. Acquire a detailed knowledge of the ultrastructure of smooth, striated, and cardiac muscles. 2. Investigate the intricate mechanisms involved in muscle contraction. 3. Analyze the dynamics of simple twitch and explore the factors contributing to fatigue. 4. Explore the structural components of neurons and their role in nerve function. 5. Understand the process of nerve impulse conduction through axons. 6. Investigate the functions of neurotransmitters and the ultrastructure of synapses. 7. Define the endocrine, paracrine, and autocrine systems, emphasizing their significance in physiological regulation. 8. Examine the structures, hormones, and functions of key endocrine glands: pituitary, thyroid, adrenal, and pancreas. 9. Analyze the hormonal control mechanisms governing male and female reproduction. 10. Explore the processes of implantation, parturition, and lactation in mammals. 11. 11. Understand the intricacies of reproductive cycles, including oestrous and menstrual cycles, and the phenomenon of menopause in humans.
6	**Course Outcomes**	1. Understand the ultrastructure of diverse muscle types. 2. Explain the intricate mechanisms of muscle contraction and identify factors contributing to fatigue. 3. Comprehend neuron structure, nerve impulse conduction, and neurotransmitter functions. 4. Define endocrine, paracrine, and autocrine systems. 5. Analyze structures, hormones, and functions of major endocrine glands.

		6. Interpret hormonal control mechanisms in male and female reproduction, including processes like implantation, parturition, and lactation in mammals. 7. Evaluate and compare reproductive cycles, encompassing oestrous, menstrual cycles, and menopause. 12. 8. Integrate concepts from muscle physiology, nerve physiology, endocrinology, and reproductive physiology, applying interdisciplinary knowledge for complex physiological analysis.

7.	Outline syllabus:				
7.01	Paper Code	Unit	Introduction	Reference number	Teaching methods
	Paper Code: ZOO-204	I	**Muscle physiology** 1. Ultra structure of smooth, striated and cardiac muscles 2. Muscle contraction 3. Simple twitch and fatigue		Providing them notes, elucidating all processes and mechanisms on a whiteboard, and conveying information through presentations (PPT) and videos.
		II	**Nerve physiology** 1. Structure of neuron 2. Conduction of nerve impulse through axon 3. Neurotransmitters 4. Synapses; ultrastructure and function		--------do-------
		III	**Endocrinology** 1. Endocrine system; definition of endocrine, paracrine and autocrine system, significance of endocrine and neuro-endocrine system 2. Pituitary gland; structure, hormones and their functions 3. Thyroid gland; structure, hormones and their functions 4. Adrenal gland; structure, hormones and their functions 5. Pancreas; islets of langerhans, structure, hormones and their functions		--------do-------
		IV	**Physiology of reproduction** 1. Hormonal control of male and female reproduction 2. Implantation 3. Parturition and lactation in mammals		--------do-------

			4. Reproductive cycle; oestrous and menstrual cycles 5. Menopause in human		

8.	Course Evaluation	
8.1	CA: 20%	
8.2	Attendance	5
8.3	Homework	-
8.4	Quizzes	5
8.5	Projects	-
8.6	Presentation	10
8.7	Any other	-
8.2	MTE	20%
8.3	End-term examination	60%
9.	Textbooks & References	
9.1	Textbook	-
9.2	References	1. Withers, P. C., Cooper, C. E., Maloney, S. K., Bozinovic, F., & Cruz-Neto, A. P. (2016). Ecological and environmental physiology of mammals (Vol. 5). Oxford University Press. 2. Hall, J. E., & Hall, M. E. (2020). Guyton and Hall textbook of medical physiology e-Book. Elsevier Health Sciences. 3. Melmed, S., Polonsky, K. S., Larsen, P. R., & Kronenberg, H. M. (2015). Williams textbook of endocrinology E-Book. Elsevier Health Sciences.
9.3	Video References	https://youtu.be/nbwpD1bqyQ8?si=KxaPeszcneLTcAdR https://www.youtube.com/live/GoFBWJZuQkU?si=ga5aS3ulWWozlujV https://youtu.be/Yjp-m9NRh4s?si=6-0EkMu3haVWm_cw https://youtu.be/V9a2AQSJIMc?si=aeBDKmiO4WulB_qZ

Practical's: Zoology Lab – IV (6 labs per week)

	Units																
Outcome	**1.1**	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**4.2**	**4.3**	**4.4**	**4.5**
1	✓	✓	✓														
2			✓				✓										
3			✓	✓			✓										
4				✓	✓		✓										
5							✓	✓									
6										✓			✓	✓	✓		
7													✓	✓	✓	✓	
8	✓	✓		✓	✓	✓		✓	✓	✓	✓						

Question Bank

1. What is the ultrastructure of cardiac muscles?
2. Explain the mechanisms of muscle contraction.
3. What are the factors contributing to muscle fatigue?
4. Describe the structure of a neuron.
5. How is a nerve impulse conducted through an axon?
6. What are neurotransmitters, and what is their role in nerve physiology?
7. Explain the ultrastructure and function of synapses.
8. Define the endocrine, paracrine, and autocrine systems.
9. Why is the endocrine system significant in physiological processes?
10. Detail the structure, hormones, and functions of the pituitary gland.
11. What are the functions of the thyroid gland hormones?
12. Describe the structure and functions of the adrenal gland.
13. Explain the role of the pancreas in maintaining physiological balance.
14. How does hormonal control influence male and female reproduction?
15. What is the process of implantation in reproductive physiology?
16. Discuss the physiological processes of parturition and lactation in mammals.
17. Compare and contrast the oestrous and menstrual cycles.
18. What is menopause, and how does it occur in humans?
19. How do smooth, striated, and cardiac muscles differ in ultrastructure?
20. Elaborate on the concept of a simple twitch in muscle physiology.
21. What are the key components of the islets of Langerhans in the pancreas?
22. How does the neuro-endocrine system interact with the endocrine system?
23. Discuss the hormonal control mechanisms involved in male reproduction.
24. Explain the significance of hormonal control in female reproduction.
25. How can interdisciplinary knowledge be applied for complex physiological analysis in muscle physiology, nerve physiology, endocrinology, and reproductive physiology?

PROJECTS (To be given to group of students)

Muscle Ultrastructure Analysis Project:
Objective: Investigate and compare the ultrastructure of smooth, striated, and cardiac muscles using advanced microscopy techniques. Explore how variations in ultrastructure contribute to the specific functions of each muscle type.

Neurotransmitter Functionality Study:
Objective: Conduct a comprehensive study on the functionality of neurotransmitters in nerve physiology. Explore the role of different neurotransmitters in transmitting signals across synapses, and investigate potential applications in neurological disorders.

Endocrine System Disorders Research Project:
Objective: Examine disorders related to the endocrine system, focusing on the pituitary gland, thyroid gland, adrenal gland, and pancreas. Investigate the causes, symptoms, and potential treatments for disorders associated with these major endocrine glands.

Reproductive Physiology and Hormonal Control Project:
Objective: Explore the intricate hormonal control mechanisms in male and female reproduction. Investigate the impact of hormonal imbalances on reproductive processes and potential interventions for fertility-related issues.

Interdisciplinary Analysis of Physiological Processes Project:

Objective: Develop an interdisciplinary project that integrates concepts from muscle physiology, nerve physiology, endocrinology, and reproductive physiology. Analyze complex physiological scenarios and propose comprehensive solutions based on the interplay of these different physiological systems. rations associated with these applications.