

**Punjab University College of
Pharmacy Faculty of Pharmacy
University of the Punjab, Lahore
Course Outline**



Programme	Pharm.D 1 st Semester	Course Code	PHARM-107 (Theory), PHARM-108 (Lab)	Credit Hours	3+1
Course Title	Physiology-I				
Course Introduction					
Physiology is the study of the normal functions and processes of the human body. This course provides students with a basic understanding of how the body is organized, how body systems communicate and work together, and how internal balance is maintained during everyday activities. It covers fundamental concepts of cellular function, movement, coordination, control mechanisms, energy production, circulation, and digestion. Students will develop knowledge of the processes that support growth, health, and survival, while understanding how different systems respond to changing conditions. This course serves as an essential foundation for further studies in medicine. Practical applications of physiology will help students relate theoretical concepts to real-life health conditions, body responses, and clinical situations. Students may also study basic experiments, measurements, and physiological processes in laboratory settings.					
Learning Outcomes					
On the completion of the course, the students will be able to:					
1. Explain the structure and function of cell components, how molecules move across membranes, and key processes like fluid balance, the cell cycle, and apoptosis in maintaining cellular stability. 2. Describe how the nervous system controls body functions, including how neurons work, how action potentials and synapses function, the role of neurotransmitters and sensory receptors, and the structure and function of the central and autonomic nervous systems. 3. Explain the structure and types of skeletal muscles, how they contract, and the role of the neuromuscular junction in muscle activity. 4. Describe the structure and function of the heart, including the cardiac cycle, blood flow, heart sounds, and electrical conduction, and interpret ECG patterns and their clinical relevance. 5. Outline the process of digestion and absorption, including digestive secretions, how they are regulated, and the steps from eating to defecation.					
Course Content (Theory)			Assignments/Readings		
Week 1	Basic Cell Functions		Widmaier, E. P., Raff, H., & Strang, K. T. (2023). Vander's human physiology: The mechanisms of body function (16th ed.). McGraw-Hill Education.		
	Overview of the physical structure of the cell				
	Extracellular fluid, intracellular fluid, phagocytosis		Assignment: Learn the covered topics in detail		
Week 2	Pinocytosis, cell cycle				
	Apoptosis				

	Movement of molecules across cell membranes	
Week 3	Diffusion, active transport, co-transport, counter-transport	
	Basic principles of osmosis, osmotic pressure	
	Osmotic equilibrium, endocytosis and exocytosis	
Week 4	Central Nervous System	Sembulingam, K., & Sembulingam, P. (2022). Essentials of medical physiology (9th ed.). Jaypee Brothers Medical Publishers Assignment: Prepare a concept chart on CNS in detail
	Physiological anatomy of brain and spinal cord, CSF	
	Blood brain barrier, types of sleep	
Week 5	Muscle Physiology Physiological anatomy of skeletal muscle	Assignment: give presentation on muscles and its contraction process
	Types of skeletal muscle fibers, general and molecular mechanisms of muscle contraction,	
	Physiological anatomy of neuromuscular junction	
Week 6	Neural Control Mechanisms	Sembulingam, K., & Sembulingam, P. (2022). Essentials of medical physiology (9th ed.). Jaypee Brothers Medical Publishers
	Functional classes of neurons,	
	Voltage-gated sodium and potassium channels	
Week 7	Resting membrane potential,	Hall, J. E. (2021). Guyton and Hall textbook of medical physiology (14th international ed.). Elsevier.
	Initiation and propagation of action potential	
	Refractory period, all or nothing principle,	
Week 8	Synapses, types of synapses,	
	Physiological anatomy of synapses	
	Excitatory and inhibitory receptors in the postsynaptic membrane	
Week 9	Excitatory and inhibitory postsynaptic potentials,	
	Classification of sensory receptors	
	Neurotransmitters and neuromodulators	
Week 10	Autonomic Nervous System	
	Physiological anatomy of sympathetic and parasympathetic nervous system	Firdaus, M. (2021). Firdaus review of physiology: Included BCQs and viva (21st ed.). Riaz Medical Publishers
	Pre-ganglionic and post-ganglionic neurons	
	Synthesis and secretion of acetylcholine	
Week 11	Synthesis and secretion of nor-epinephrine from nerve terminal	
	Effects of sympathetic and parasympathetic nervous system on various organs of the body,	

	Denervation supersensitivity and its mechanism, autonomic reflexes	Assignment: Prepare flow chart of ANS.
Week 12	Physiological anatomy of heart muscle	Hall, J. E. (2021). Guyton and Hall textbook of medical physiology (14th international ed.). Elsevier.
	Structure of heart	
	Course of blood flow through heart	
Week 13	The cardiac cycle,	Assignment: Attempt quiz on covered topics of Heart
	Conduction system of heart,	
	Characteristics of normal electrocardiogram, relationship of electrocardiogram to the cardiac cycle, clinical significance of abnormal electrocardiographic patterns	
Week 14	Definitions: (systole, diastole, stroke volume, cardiac output, preload, afterload, ejection fraction). heart sounds, murmurs	Widmaier, E. P., Raff, H., & Strang, K. T. (2023). Vander's human physiology: The mechanisms of body function (16th ed.). McGraw-Hill Education.
	Gastro-intestinal secretions (salivary secretions, gastric secretions)	
	Gastro-intestinal secretions (pancreatic secretions, biliary secretions)	
Week 15	Nervous and hormonal regulation of gastric secretions	Hall, J. E. (2021). Guyton and Hall textbook of medical physiology (14th international ed.). Elsevier.
	Nervous and hormonal regulation of gastric secretions	
	Mastication, deglutition, gastric emptying	Assignment: prepare presentation on GIT and its Regulation
Week 16	Intestinal movements (peristalsis, segmenting & mixing),	
	Biliary enterohepatic circulation, defecation,	
	Overview of enteric nervous system.	
Textbooks and Reading Material		
Main source: Widmaier, E. P., Raff, H., & Strang, K. T. (2023). Vander's human physiology: The mechanisms of body function (16th ed.). McGraw-Hill Education.		
Other sources:		
1. Barrett, K. E., Barman, S. M., Brooks, H. L., & Yuan, J. X. J. (2019). Ganong's review of medical physiology (26th ed.). McGraw-Hill Education.		
2. Costanzo, L. S. (2024). BRS physiology (7th ed.). Wolters Kluwer		
3. Firdaus, M. (2021). Firdaus review of physiology: Included BCQs and viva (21st ed.). Riaz Medical Publishers.		
4. Hall, J. E. (2021). Guyton and Hall textbook of medical physiology (14th international ed.). Elsevier.		
5. Sembulingam, K., & Sembulingam, P. (2022). Essentials of medical physiology (9th ed.). Jaypee Brothers Medical Publishers		
6. Sherwood, L. (2016). Human physiology: From cells to systems (9th ed.). Cengage Learning.		
7. Wecker, L., & Ingram, S. L. (2024). Brody's human pharmacology: Mechanism-based therapeutics (7th ed.). Elsevier.		
8. Widmaier, E. P., Raff, H., & Strang, K. T. (2023). Vander's human physiology: The mechanisms of body function (16th ed.). McGraw-Hill Education.		

Course content (Practical/lab)

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

1. Determine the systolic and diastolic blood pressure of a human volunteer using a mercury sphygmomanometer and the heart rate by the palpatory method
2. Determine the blood pressure and heart rate of a human volunteer during physical activity (exercise)
3. Demonstrate the technique of venous blood sampling from human volunteer or using simulators/training model.
4. Demonstrate the administration technique of intramuscular injection to human volunteer or using simulators/training model.
5. Demonstrate the administration technique of subcutaneous injection to human volunteer or using simulators/training model.
6. Demonstrate the administration technique of intra-venous injection to human volunteer or using simulators/training model.
7. Determine the body mass index (BMI) of a human volunteer
8. Observe the peristaltic activity (spontaneous contractions) of rabbit jejunum
9. Determine the visual acuity, far vision, near vision and field of vision (Perimetry).
10. Explain the various abnormal electrocardiogram patterns and discuss the clinical significance
11. Observe the effects of different concentrations of salt solutions on red blood cells (isotonic, hypotonic, and hypertonic).

Assignments: Types and Number with Calendar

Assignment/presentation (20 marks)			Class quiz (30 marks)	
No.	Week	Deadline for submission	No.	Week
Assignment 1 (Pre-mid)	Week 3	Within the timeline assigned by the teacher	Quiz 1 (pre-mid)	Week 4
			Quiz 2 (pre-mid)	Week 7
Assignment 2 (Post-mid)	Week 11		Quiz 3 (post-mid)	Week 10
			Quiz 4 (post-mid)	Week 14