

DISCIPLINE SPECIFIC CORE COURSE -6 (DSC-6) HUMAN PHYSIOLOGY AND ANATOMY II

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Human Physiology and Anatomy II	4	3	-	1	Class XII pass with Physics, Chemistry and Biology as papers in Class XII.	NA

Learning Objectives

The Learning Objectives of this course are as follows:

- The course curriculum is a systematic presentation of physiological concepts to ensure appropriate depth and breadth of basic functioning of the human body and its interrelations with respect to heart, lung, kidney, gonads, endocrine glands and digestive system.
- It would give students exposure of physiological concepts needed as foundations for further studies in pharmacology, pathology and pathophysiology etc.
- It would provide a base to understand body defenses and the mechanisms of deranged function of human body
- The curricular objectives are focused primarily on normal body function. Accordingly, wherever possible clinical examples have been illustrated to the underlying physiological principles.

Learning outcomes

The Learning Outcomes of this course are as follows: Having successfully completed this course, students shall be able to learn and appreciate:

- The students will learn appreciate the structure and functioning of heart, pattern and significance of blood flow in the blood vessels, heart sounds, ECG and purpose of lymph and lymphatic circulation.
- The students would correlate how structure and function of lungs are so intricately designed and how they function with its blood flow and help giving vital oxygen to body. They would develop understanding for neural control and other regulators of respiration and understand daily phenomenon like coughing, sneezing, yawning etc.
- Kidneys are vital organs and students would learn the functional anatomy of a nephron and how it contributes in removing the toxic waste from our body in form of urine. The curriculum would outline the process of micturition and abnormalities associated with it. It would also highlight the role of kidney in controlling pH of the body and preventing acidosis/alkalosis
- The students would have insight into the anatomy of the female and male reproductive systems, including their accessory structures. The student would understand the role of hypothalamic and pituitary hormones in reproductive system. Trace the route of a sperm mother cell from its production till it can fertilize an oocyte. Explain the events in the ovary prior to ovulation, development and maturation of the sex organs and the emergence of secondary sex characteristics during puberty.

- The students would be able to integrate the role of the endocrine system to maintain homeostasis in human body. Understand the chemical composition mechanisms of hormone action, their site of production, regulation, and effects of hormones of the pituitary, thyroid, parathyroid and adrenal, glands. Hormonal regulation of the reproductive system. The role of the pancreatic endocrine cells in the regulation of blood glucose In addition the contributions of hormones released by the heart, kidneys, and other organs with secondary endocrine functions. The student would be aware of several common diseases associated with endocrine system dysfunction.
- Students would be able to understand the organs of the alimentary canal from proximal to distal, and understand their function. Identify the accessory digestive organs and their functions. Describe the histology that is four fundamental tissue layers of the digestive tract. Contrast the contributions of the enteric and autonomic nervous systems to alimentary tract functioning. Gain awareness about common dysfunctions of digestive system like constipation, gastritis, ulcers, diarrhea etc.

SYLLABUS OF DSC-6:

Unit-I: Cardiovascular System (02 Weeks)

Functional Anatomy of heart, The Cardiac Cycle, Electrocardiogram. Circulatory system: Blood vessels, hemodynamics and regulatory mechanisms, Lymphatic circulation - hemodynamics and regulation, micro-circulation

Unit-II: Respiratory system (02 Weeks)

Functional Anatomy of the respiratory system. Mechanisms of pulmonary ventilation, alveolar ventilation, gaseous exchange, transport of gases, respiratory and nervous control and regulation of respiration

Unit-III: Renal Physiology (02 Weeks)

Body fluid and electrolytes: their balances and imbalances. Functional Anatomy of kidney, Histology of nephron and its physiology, Urine formation, renal regulation of urine volume and osmolarity, acid-base balance. Urinary bladder: structure, micturition and its regulation

Unit-IV: Reproductive System (02 Weeks)

Structure and function of male and female reproductive organ. Function and regulation of testicular and ovarian hormones. Gametogenesis (oogenesis and spermatogenesis), fertilization, implantation, parturition and lactation, menopause and basic concepts of infertility.

Unit V: Endocrine System (02 Weeks)

General mechanism of hormone action, Structure, function and regulation of the following glands and their secretions: Pituitary, Hypothalamus, Thyroid, Parathyroid, Adrenal, and Pancreas. Basic concepts about hypo and hyper secretion of hormones.

Unit VI: Gastrointestinal system (02 Weeks)

Anatomy and histology of digestive tract, gastrointestinal physiology: General principles of gut

motility secretion, digestion, absorption and assimilation. Gastrointestinal hormones: their formation and action. Physiological anatomy and functions of liver and pancreas.

Practical component

(Wherever wet lab experiments are not possible, the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Physiological data acquisition based experiments (ECG).
2. Physiological data acquisition-based experiments (EMG).
3. Physiological data acquisition-based experiments (PFT).
4. Blood Pressure recordings in humans.
5. Determination of specific gravity of blood.
6. Determination of osmotic fragility of RBC.
7. To study various types of contraceptives (condoms, IUD's, oral and injectable contraceptives)
8. To study different human organs and their sections through permanent slides. T. S. of thyroid, liver, thymus, spleen, ovary, artery, vein, capillaries, testis, pancreas, esophagus, adrenal, kidney (cortex and medulla), urinary bladder, urethra, fallopian tubes, epididymis, prostate glands, lungs, trachea, bronchioles, pituitary, heart. (Minimum 8 slides covering the systems mentioned in theory.)

Essential/recommended readings:

- Guyton and Hall Textbook of Medical Physiology, 14th edition (2020), J. E. Hall; W B Saunders and Company, ebook ISBN: 978-0-3236-4003-9; Hardcover ISBN: 978-0-3235-9712-8
- Human Physiology, 16th edition (2011), Stuart I. Fox; Tata McGraw Hill, ISBN10: 1260720462; ISBN13: 978-1-26-072046-4.
- Principles of Anatomy and Physiology, 16th edition (2020), Gerard J. Tortora and Bryan H. Derrickson; Wiley and Sons, ISBN: 978-1-119-66268-6. (e book), ISBN: 978-1-119-70438-6 (for print book).
- Textbook of Practical Physiology, 9th edition (2019), CL Ghai; Jaypee Publication, ISBN-9789352705320.
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Suggestive readings:

- Ganong's Review of Medical physiology, 26th edition (2019), K. E. Barrett, S. M. Barman, S. Boitano and H. Brooks; Tata McGraw Hill, ISBN 978-1-26-012240-4 (for ebook) ISBN:978-1-26-012241-1 (for print Book)