Department of Physiology

Garhbeta College

Garhbeta: Paschim Medinipur :: 721127 West Bengal

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Programme Outcome (PO) For B.Sc. Hons.

PO	Description
PO1	Demonstrate knowledge and understanding of the fundamental concepts in all areas of science
PO2	Demonstrate critical thinking analytical reasoning and judgment in identifying and solving specific problems with intellectual independence
PO3	Design and carry out scientific experiments as well as accurately record and analyse the result of the experiments
PO4	Demonstrate communication skills to present a clear, coherent and independent expression of knowledge and ideas
PO5	Develop the ability to communicate scientific information and research results in written and oral formats
PO6	Demonstrate understanding of the interconnections of knowledge within and across disciplines
PO7	Apply knowledge, theories methods and practices in their chosen field of study to address real-world challenges and opportunities
PO8	Inculcate the ability to find jobs in different fields like teaching, banking, industry and also in different fields of higher study and research
PO9	Accomplish a nature of lifelong learning to acquire the ability of grasping any scientific text in the broadest context of scientific development
PO10	Demonstrate sensitivity and readiness to share their knowledge, experience and capabilities with the marginalized and oppressed in their communities

Programme Specific Outcome (PSO) For B.Sc. Hons. in Physiology

PSO	Description
PSO1	Students will study and acquire complete knowledge of disciplinary as well as allied biological sciences
PSO2	Helps students to be more equipped to learn and know about physiological systems, their coordination and control as well as structure and function
PSO3	They are able to correctly use biological instrumentation and proper laboratory techniques
PSO4	Students will be able to qualitatively and quantitatively analyse physiological parameters using various statistical and computational tools used in modern sciences
PSO5	Students will be able to communicate biological knowledge in oral and written form.
PSO6	Learn to maintain healthy working environment in laboratory
PSO7	Students will be able to identify the relationship or synchronization between structure and function at all levels: molecular, cellular, and organismal.
PSO8	Students will be able to apply the scientific method to questions in biology by formulating testable hypotheses, gathering data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.
PSO9	Acquired skills in diagnostic testing, hematology, histopathology, staining procedures etc. used in clinical and research laboratories will provide them opportunity to work in diagnostic or research laboratory.
PSO10	Demonstrate knowledge for betterment of our daily life

COURSE OUTCOME (CO) FOR THE ACADEMIC YEAR 2021-2022

Name of the Course: B.Sc. Honours. In Physiology

Core Course: Physiology

Semester - I

Paper Code & Name	Outcomes	
CCI (Cellular Basis of Physiology) **C1T**	**CO1**	Know the basic of structure and function of prokaryotic & eukaryotic cells: Structure of plasma membrane –Bio-chemical components, arrangement& Functions
	CO2	Understands the structure and function of different cellular organelles
	CO3	Know the structure, classification, distribution and functions of different tissues
	CO4	Understand Development and organization of different organs and systems
	CO5	Understand basic principle and use of different microscopes and spectrophotometer
C1P (Histology)	**CO1**	Study and Identify Stained Sections of different Mammalian Tissue and Organs.
CC2 (Biological Physics and Enzymes) **C2T**	**CO1**	Understand the units for measuring concentration of solute. Bonds and Forces in Bio-molecules.
	CO2	Understand biophysical and biochemical principles, electro kinetic properties, buffers and laws of thermodynamics
	CO3	Understand Nanoparticles and its application in Physiology; Laminar and Streamline flow
	CO4	Know the concepts of enzyme kinetics , structure, regulation & clinical diagnosis
	CO5	Understand flow and pressure and ultracentrifugation
C2P	**CO1**	Understand oncotic pressure of colloidal solutions
	CO2	Determination of Systolic, Diastolic, Pulse and Mean Blood Pressure
	CO3	Determination of enzyme actions
CC1 (DSC1A)	**CO1**	Learn about Cellular Physiology and Biophysical Principles

C1T (Cellular Physiology, Biophysical Principles, Biochemistry, Digestive system & Metabolism)		
	CO2	Understand about Biochemistry and Metabolism; Study about digestive system
C1P	**CO1**	Learn about Examination & staining of fresh tissue
	CO2	Learn about the Identification of permanent slides

Semester - II

Paper Code & Name	Outcomes	
CC3 (Physiology of Nerve & Muscle Cells) **C3T**	**CO1**	Understand nerve Cells, Properties, electrical events within the nerve cells; Nerve Fiber Types & Function
	CO2	Understand Skeletal muscle , cardiac muscle, smooth muscle; properties, morphology, Electrical Properties, Mechanical Properties, energy source & Metabolism
	CO3	Study Synaptic & Junctional Transmission; neuromuscular junctions
	CO4	Study about the Initiation of Impulses in Sense Organs & receptors
C3P (Histological Study, Experiment of Nerve and Muscle)	**CO1**	Isolation and Staining of nerve fibers & muscle fibers
	CO2	Study of Kymograph; Kymographic recording of mechanical responses, effects of variations of temperature and load of gastrocnemius muscle

	CO3	Calculation of work done by the muscle. Determination of nerve conduction velocity
CC4 (Chemistry of Bio-molecules) C4T	**CO1**	Know about the classification, structure, Properties and Functions of Carbohydrates, Proteins and lipids
	CO2	Understand Structure, types and Function of DNAs and RNAs
C4P (Biological Chemistry)	**CO**	Qualitative tests for the identification of physiologically important substances
CC4 (DSC1B) **DSC1BT** **(Blood, body fluid and immune System, Cardiovascular System and Respiratory System)**	**CO1**	Learning about Blood & Body fluids; immune system
	CO2	Gaining knowledge about the cardiovascular system and respiratory system
DSC1BP	**CO1**	Acquiring practical knowledge about the hematological experiments
	CO2	Developing practical skills in human experiments

Semester - III

Paper Code & Name	Outcomes	
CC5 (Physical Chemistry) C5T	**CO1**	Study about blood ,bone marrow, blood Cells, Immune mechanisms, Blood Types, Plasma, hemostasis & Lymph
	CO2	Understanding about the clinical implications associated with body fluids
C5P (Hematological Experiments)	**CO1**	Preparation and staining of blood film with Leishman's stain. Identification of the blood corpuscles
	CO2	Differential count & Total count of RBC and WBC. Determination of Bleeding time and clotting time
	CO3	Hemoglobin estimation. Preparation of haemin crystal, Preparation and staining of bone marrow, Blood group determination.
CC6 (Circulation) C6T	**CO1**	Study about the Origin of the Heartbeat & the Electrical Activity of the heart; cardiac & systemic diseases
	CO2	Study about the Mechanical Events of the Cardiac Cycle & Cardiac Output
	CO3	Understanding about the Dynamics of Blood & Lymph Flow
	CO4	Understanding Cardiovascular regulatory Mechanisms & Circulation Through special Regions
	CO5	Study role of Cardiovascular Homeostasis in Health & Disease
C6P (Cardiovascular Physiology Experimental)	**CO1**	Preparation of Amphibian Ringer solution; Kymographic recording of the movements of perfused heart of toad
	CO2	Study of the effects of changes in perfusion fluid pressure, temperature, excess calcium and potassium ion concentration, acetylcholine, adrenaline on the on the movement of heart.
CC7 (Functions of the Nervous System)	**CO1**	Study about the Reflexes; Cutaneous, Deep & Visceral Sensation
	CO2	Learning about the Arousal Mechanisms, Sleep, & the Electrical Activity of the Brain
	CO3	Understanding about the functions of the various parts of the brain in Control of Posture & Movement

C7T	**CO4**	Learning about The Autonomic Nervous System & Central Regulation of Visceral Function
	CO5	Understanding about the Neural Basis of Instinctual Behavior & Emotions; " Higher Functions of the Nervous System": Conditioned Reflexes , Learning, & Related Phenomena
C7P (Neurological Experimental)	**CO1**	Experiments on superficial and deep reflex ;Measurement of grip strength
	CO2	Determination of Reaction time; Short term memory test & Two point discrimination test
SEC-1 (Clinical Biochemistry) **SEC1T**	**CO1**	Photo-colorimetric estimation of blood constituents.
	CO2	Measurement of blood glucose , blood inorganic phosphate, serum total protein, determination albumin globulin ratio, determination of serum amylase
CC3 (DSC1C) **DSC1CT** **(Nerve –Muscle Physiology, Nervous system, Skin and Body Temperature Regulation)**	**CO1**	Study about nervous system & Nerve-muscle Physiology
	CO2	Learning about Histological structure & functions of skin and body temperature regulation
DSC1CP	**CO1**	Learning about the staining of muscle fibers
	CO2	Developing practical skills in neurological experiments

Semester - IV

Paper Code & Name	Outcomes	
CC8 (Energy	**CO1**	Learning about Energy metabolism, Carbohydrate metabolism, Protein metabolism
	CO2	Understanding Biological oxidation, Fat and cholesterol metabolism

Balance, Metabolism and Nutrition) **C8T**	**CO3**	Building the concept about Reactive Oxygen Species, nutrients, nutraceutical, cosmoceutical, neutrigenomic
	CO4	Study about Biological value of proteins, vitamins and minerals, Human nutrition
C8P (Biochemical Estimation)	**CO1**	Learning Quantitative estimation of glucose and sucrose
	CO2	Learning Quantitative estimation of amino nitrogen
	CO3	Estimation of percentage quantity of lactose in milk
CC9 (Gastrointestinal Function) **C9T**	**CO1**	Learn the basic concept about Digestion & Absorption of food materials
	CO2	Understanding the Regulation of Gastrointestinal Function, Gastrointestinal hormones
	CO3	Studying the Mechanism, function and regulation of mastication, deglutition, movements of alimentary canal
C9P (Gastrointestinal Function)	**CO1**	Learning about Dale's Experiments; Kymographic recording of normal movements of rat's intestine
	CO2	Studying the Effects of hypoxia, acetylcholine and adrenaline on normal intestinal movements
CC10 (Respiratory Physiology) **C10T**	**CO1**	Studying about the Pulmonary Function; Anatomy of the lungs, Mechanics of breathing, Gas exchange in the lungs.
	CO2	Learning about the Gas transport between the Lungs & the tissues
	CO3	Understanding the Regulation of Respiration; chemical and neural control
	CO4	Study about the Respiratory adjustments in Health & Respiratory Disease
C10P (Respiratory Physiology)	**CO1**	Acquiring skills about Measurement of peak expiratory flow rate & Measurement of forced expiratory volume
	CO2	Understanding the Measurement of oxygen saturation by pulse oxymeter
SEC2 (Computer application in Health science) **SEC2T**	**CO1**	Studying the Importance of computer application in biological sciences and medicine
	CO2	Studying about the Brief history of development of computer & its application in health sciences
	CO3	Understand Computer Software & Hardware – types &function.
	CO4	Studying the Application of computer in physiology and medicine, Application of computer in physiological data analysis &r in physiological models

	CO5	Learning about the Computer assisted therapy in health science
SEC2P (Computer application in Health science)	**CO1**	Learning about the Basic operation of computer: data entry, Graphical presentation of data & tabulation of physiological data
	CO2	Understanding the Computation of frequency and percentage distribution of different physiological parameters
	CO3	Learning about the Significance of testing by 't' test with interpretation & Preparation of case history of a patient by using computer
CC4 (DSC-1D) **DSC1DT (Sensory Physiology, Endocrine and Reproductive System, Renal Physiology)**	**CO1**	Study about Sensory Physiology & Endocrinology
	CO2	Gain knowledge about the reproductive physiology and renal physiology
DSC1DP	**CO1**	Develop practical skills in Staining and identification of different tissue sections
	CO2	Learn about the estimation of different constituents of urine; sperm count and sperm motility
	CO3	Learn how to determine of visual acuity & colour blindness
SEC-2 **(Instrumentation Techniques in Biology)**	**CO1**	Learn about the basics of Microscopy- Features, Working principle, Advantages and limitations; different types of microscopy
	CO2	Study about the different staining methods and optical methods
	CO3	Develop understanding about the different methods of chromatography ; Biotechnology and Immunological techniques

Semester - V

Paper Code & Name	Outcomes	
CC11 (Sensory Physiology) **C11T**	**CO1**	Study of the Classification of general and special senses and their receptors
	CO2	Understanding about the neural pathway of touch, pressure, pain, thermal and kinesthetic sensation
	CO3	Acquiring knowledge about the vision, visual pathway, and the various biological mechanisms associated with vision
	CO4	Learning about the Hearing & Equilibrium, sound waves , auditory pathway and disorders associated with the mechanisms
		Study about the Smell & Taste: Receptors, Pathways, Physiology of Taste & Features of Taste sensation
C11P (Histological and Human Experiments)	**CO1**	Studying Principles of fixation and staining
	CO2	Learning to Determine visual acuity & color blindness
	CO3	Learning about how to map the peripheral field of vision with perimeter & Mapping of physiological blind spot
	CO4	Understanding Recording of auditory and visual reaction time & Exploration of conductive and perceptive deafness
CC12 (Endocrinology) **C12T**	**CO1**	Understanding the Concept of endocrine systems, glands, hormones Types of endocrine glands Experimental and clinical methods of study of endocrine glands.
	CO2	Studying the Morphology, structure, function, and regulation of pituitary gland
	CO3	Learning about the Anatomical considerations, Electron microscopic structure, functions of thyroid gland and thyroid hormones; diseases associated with thyroid gland
	CO4	Knowing about the Hormonal Control of Calcium Metabolism & the Physiology of Bone
	CO5	Acquiring knowledge about the Adrenal Medulla & Adrenal Cortex:
	CO6	Understanding the Endocrine Functions of the Kidneys, Heart, & Pineal Gland
	CO7	Studying Endocrine Functions of the Pancreas & the Regulation of Carbohydrate Metabolism

C12P (Endocrinology)	**CO1**	Gathering skills about Fixation, staining and identification of endocrine glands
	CO2	Studying the effects of oxytocin & adrenaline on uterine contraction of albino rat
	CO3	Learning to Estimate estrogen by spectrophotometric method & plasma level of any hormone using ELISA
DSE - 1 (Biostatistics) **DSE1T**	**CO1**	Studying about the Scope of statistics– utility and misuse, Principles of statistical analysis of biological data
	CO2	Knowing about the Basic concepts – variable, Population and sampling -- parameter, Presentation of data
	CO3	Understanding about the statistical tabulation and presentation of data and various statistical methods of data analysis
	CO4	Learning about Degrees of freedom, probability. Normal distribution
	CO5	Testing of hypothesis Distribution-free test - Chi-square test. Linear correlation and linear regression
DSE1P (Biostatistics)	**CO1**	Learning about the Computation of mean, median, mode, standard deviation and standard error ,of the physiological data of human subjects
	CO2	Studying about Graphical representation of data in frequency polygon and histogram, Student's t test
	CO3	Understanding about Statistical analysis and graphical representation of biological data with computer application program
DSE - 2 (Sports Physiology, Work Physiology and Ergonomics) **DSE2T**	**CO1**	Learning the Concepts of physical work and physiological work
	CO2	Studying about the Exercise & Performance, affecting factors and associated tests
	CO3	Building concepts about Physical Training: General principles and different methods, sports nutrition
	CO4	Knowing Basic concepts of sports psychology, Sports Biochemistry, Ergogenic aids & Dietary supplement
	CO5	Studying Ergonomics – Basic concepts and its application in industry to improve efficiency; Occupational diseases
	CO6	Understanding Anthropometry and its implication in general; Sports Anthropometry
DSE2P	**CO1**	Learning Measurements of resting and working heart rate using thirty beats and ten beats methods; Measurement of blood pressure
	CO2	Developing practical skills about the Determination of Physical Fitness Index, recording of recovery heart rate after standard exercise, cardiac cost of specific work, VO2 max, endurance time
	CO3	Learning the Measurement of some common anthropometric parameters

	CO4	Learning Determination of body surface area, Body Mass Index & body fat percentage
DSE -1A **DSE -1AT** **(Sports Physiology, Work Physiology and Ergonomics)**	**CO1**	Learning the Concepts of physical work and physiological work ; Studying about the Exercise & Performance, affecting factors and associated tests
	CO2	Building concepts about Physical Training: General principles and different methods, sports nutrition
	CO3	Studying Ergonomics – Basic concepts and its application in industry to improve efficiency; Occupational diseases
DSE1AP	**CO1**	Learning Measurements of resting and working heart rate using thirty beats and ten beats methods; Measurement of blood pressure
	CO2	Developing practical skills about the Determination of Physical Fitness Index, recording of recovery heart rate after standard exercise, cardiac cost of specific work, VO2 max, endurance time
	CO3	Learning the Measurement of some common anthropometric parameters
SEC- 3 (Maternal and Child Nutrition)		Develop concepts about the nutritional management during pregnancy, child care management; child nutrition policy programs

Semester - VI

Paper Code & Name	Outcomes	
CC13 (Reproductive Physiology, Embryology and Chronobiology) **C13T**	**CO1**	Learning about the general concepts of Reproductive physiology
	CO2	Knowing about the anatomy, control & functions of Male & Female Reproductive System
	CO3	Studying about Pregnancy: Fertilization and the establishment of pregnancy , Hormonal control ,Placenta formation ,Pregnancy tests, Parturition
	CO4	Studying about Lactation and Mammary gland: structure , function; milk ejection reflex

	CO5	Understanding Reproductive Health , Reproductive Genetics, Human Genetics and Human Reproductive Disorders
	CO6	Building concepts about Embryology & Chronobiology
C13P (Reproductive Physiology, Embryology and Chronobiology)	**CO1**	Study of estrous cycle; Tissue fixation, microtomy , slide preparation
	CO2	Examination of histological sections of permanent slides of rat/human
	CO3	Pregnancy test from human urine; Sperm count, sperm motility test in rat
	CO4	Study of circadian functions in humans
	CO5	Project work on assessment of individual differences in human circadian rhythms by questionnaire method
CC14 (Renal Physiology, Skin and Body Temperature Regulation, Biomedical Instrumentation) **C14T**	**CO1**	Gaining general concepts about Renal Physiology- structure and function of kidney
	CO2	Learning about the Mechanism of urine formation, Constituents of urine, Disorders of Renal Functions
	CO3	Study the Physiology of Urinary bladder, urine storage and micturation, neural controls
	CO4	Acquiring knowledge about Skin and Body Temperature Regulation
	CO5	Study about the Biomedical basis of Diseases & Basics of Biomedical Instrumentation
	CO6	Building concepts about Medical diagnostic techniques related equipment & Biomedical instruments
	CO7	Acquiring knowledge about Optics, Fiber Optics, Diathermy equipment, Audiometer and Laser; Application of computer in Biomedical field, Biotelemetry, Physiological modeling-
C124P	**CO1**	Learning Tissue fixation, embedding in paraffin, microtomy, slide preparation
	CO2	Identification for normal & abnormal or pathological constituents of urine
	CO3	Learning Tests for urinary deposits, Detection of specific gravity of urine

	CO4	Learning how to Estimate albumin, urea & total phosphates in urine
	CO5	Knowing how to Study the skin to blunt injury - triple response
DSE - 3 (Microbiology and Biotechnology) **DSE3T**	**CO1**	Learning about the Viruses: structure, lytic & lysogenic cycle; Viroids and Prions
	CO2	Studying Bacteria: structure, classification; Staining :- Principle , procedure; Understanding Bacterial metabolism: pathways
	CO3	Study about the Antibiotics, bacteriostatic & bactericidal agents, Bacteriolytic agents
	CO4	Building Concepts about antiseptic, probiotics and prebiotics; Basic idea about medical bacteriology, mycology, Food microbiology
	CO5	Understanding Environmental Microbiology: Role of microbes in Bio-geo chemical cycle
	CO6	Study History and importance DNA and RNA. Gene, Genome and Genetic code
	CO7	Learning Recombinant DNA technology: concepts, techniques and application
	CO8	Understanding various methods and techniques used in biotechnology; Physiology and biotechnology process
	CO9	Learning about Bio-pesticides, bio-plastics, biosensors, biochips; Bio-safety and intellectual property Rights
DSE3P	**CO1**	Learning about disinfection and sterilization techniques; Culture procedure and isolation of bacteria; Biochemical characterization of microorganisms
	CO2	Gaining practical skills about various staining techniques of bacteria ; Bacterial spore staining; Isolation of DNA from blood and microbial culture
(Microbiology and Biotechnology	**CO3**	Acquiring skills about Separation of DNA, Extraction of DNA & Quantification of DNA; Quantification of protein
	CO4	Understanding various biochemical techniques and processes in biotechnology
DSE – 4 **(Patho-physiological Basis of Diseases)** **DSE4T**	**CO1**	Study about the History of pathology, Basic definitions and common terms used in pathology, scope and techniques used.
	CO2	Building concepts about Cell Injury and responses of cells: Cellular Adaptations and Cell Death
	CO3	Learning the Role of inflammation in disease & Role of tissue repair healing and fibrosis
	CO4	Study about Common Hemodynamic Disorders & Nutritional diseases
	CO5	Acquiring knowledge about Cancer biology & discussion about Infectious diseases epidemiology
	CO1	Learning about Urine analysis; Measuring Erythrocyte Sedimentation Rate

DSE4P (Patho-physiological Basis of Diseases)	**CO2**	Gaining skills of Tissue Processing and preparation of permanent histological slide
	CO3	Indulge in Study of histological slides of various pathological conditions; Diagnostic tests for detection of various diseases
	CO4	Learning about PCR based techniques & Physiological data acquisition
DSE-1B **DSE1BT** **(Clinical Hematology)**	**CO1**	Study about different types of anemia; Laboratory investigation and management
	CO2	Learn about different blood cells; Hemostasis and Coagulation
	CO3	Learn about blood groups and develop theoretical knowledge about different hematological experiments
DSE1BP	**CO1**	Learn how to determine PCV, ESR, total RBC count and WBC count reticulocyte count, blood group
	CO2	Develop practical skills about the staining and isolation of different blood cells
SEC-4 **(Health Psychology, Physiology of stress and Stress Management)**	**CO1**	Learn about health psychology, health behavior; Barriers to health behavior; Theories of health behavior and their implications.
	CO2	Study about the Physiology of Stress and stress management