

**COOCH BEHAR PANCHANAN BARMA UNIVERSITY**

**Syllabi for**

**4 YEARS UNDER GRADUATE COURSE IN**

***PHYSIOLOGY***

**(Under Curriculum and Credit Framework, 2022)**

**(Effective from the academic session 2023-2024 and onwards)**

## Scheme and Distribution of Credits for 4 Years Under Graduate Course in Physiology

Semester	Course Code	Course Detail	Credit
<b>I</b>	Major 1	Cellular Physiology, Biophysics & Biophysical Chemistry	6
	Minor 1	Decided by the respective College	6
	MDC 1	Nutritional Physiology	3
	SEC 1	Decided by the respective College	3
	AEC 1	Decided by the respective College	4
	<b>Total Credit in Semester I</b>		
<b>II</b>	Major 2	Haematology & Nerve-Muscle Physiology	6
	Minor 1	Decided by the respective College	6
	VAC 1	Decided by the respective College	3
	SEC 2	Decided by the respective College	3
	Intern	Decided by the respective College	4
	<b>Total Credit in Semester II</b>		

**Programme Specific Objectives:**

The basic objective of the course is comprehensive understanding of human physiology. The course emphasizes on the detail structure- function relationship of different systems of human body. The biochemical reactions, molecular integrations and responses to internal and external environment are also included in the course. The intervention of new technologies and biomedical instruments in combating the anomalies in physiological processes are also addressed.

**Programme Specific Outcomes:**

- Demonstrate comprehensive understanding of the structure and function of the human body.
- Evaluate the impact of the recent information on the current concepts related to various topics of physiology
- Plan and execute physiology-related laboratory experiments or field investigations, analyses and interpret the collected information using appropriate methods
- Demonstrate elementary understanding of the clinical applications of physiology
- Enhance the capability of students to answer and explain the urgings that they face in next level of studies.

Physiology 4 years Course	
<b>Semester I</b>	
<b>Major 1</b>	Paper Name: <b>Cellular Physiology, Biophysics &amp; Biophysical Chemistry</b>
<b>Total Credit-06</b> (Theory-04, Practical-02)	
<b>Course Code</b>	<b>Subject of the Course</b>
	<p><b>Theory: 04 Credit</b></p> <p><b>Unit I:</b>  General concept of electron microscopic structure of animal cells and cell organelles and their functions (Special emphasis on Nucleus, Endoplasmic reticulum, ribosomes, Golgi bodies, Mitochondria, Lysosomes, Peroxisomes),  Electron microscopic structure of plasma membrane and its functions, Membrane transport (Passive, active and carrier-mediated transport, Ion channels, Ionophores),  Cytoskeletal Structure, Extracellular matrix components, Intracellular communications (Tight Junctions, gap junctions, adherens junctions, desmosomes, Intercalated disc, and cell adhesion molecules).</p> <p><b>Unit II:</b>  Cell Division (Mitosis and Meiosis),  Cell cycle and its regulation, Check points of cell cycle  Cell death (Apoptosis, Necrosis, autophagy) and Aging (Physiological and metabolic changes)  Histological structure of animal tissues and functions (Special emphasis on epithelial tissue, connective tissue, areolar tissue, adipose tissue, and glandular tissues)  Homeostatis- General Concept.</p> <p><b>Unit III:</b>  Measurement of concentration of solutes (Normality, Molarity, Molality, Formality, Moles Equivalent),  Principles of dilution,  pH and Buffer- General concept,  Osmosis and Diffusion- General concept and physiological importance,  Surface tension and Specific Gravity- General concept and physiological importance,  Colloids- Definition, Types, Properties, and Importance  Biophysical aspect and physiological aspect of flow and pressure (Special emphasis on Laminar and streamline flow,</p>

	<p>Poiseuille- Hagen Formula, Laplace's Law, Bernouli's Principle), Viscosity and Resistance- General Concept and physiological importance.</p> <p><b>Practical:</b> <span style="float: right;"><b>02 Credit</b></span> Introduction on principle and function of different components of microscope, Identification of stained sections of different mammalian tissues and organs (Bone, trachea, lungs, spleen, lymph gland, esophagus, stomach, duodenum, ileum, jejunum, large intestine, liver, kidney, ureters, salivary gland, pancreas, thyroid gland, adrenal gland, testis, ovary, uterus, spinal cord, cerebral cortex, cerebellum, skin, cardiac muscle, skeletal muscle, smooth muscle, artery, vein, tongue.)</p> <p>Preparation and measurement of the strength of buffer solutions, Measurement of pH of the given buffer solutions, Determination of systolic, diastolic, pulse and mean blood pressure by Auscultatory method.</p>
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Physiology 4 years Course	
<b>Semester II</b>	
<b>Major 2</b>	Paper Name: <b>Haematology &amp; Nerve-Muscle Physiology</b>
<b>Total Credit-06</b> (Theory-04, Practical-02)	
<b>Course Code</b>	<b>Subject of the Course</b>
	<p><b>Theory:</b> <span style="float: right;"><b>04 Credit</b></span></p> <p><b>Unit I:</b> Composition and functions of blood, Plasma Protein, Plasmapheresis, Bone marrow, RBC- Erythropoiesis, Characteristics, and fate, Haemoglobin- Chemistry, biosynthesis, fate, types &amp; derivatives, functions, haemoglobinopathies,</p>

Platelets: Blood coagulation- Mechanisms, factors, anticoagulants, coagulation-hastening factors, prothrombin time, coagulation disorders,  
WBC- types, leukopoiesis, fate,  
Blood Group: ABO, Rh-typing, Blood transfusion: General concept, hazards, and precautions,  
Different diagnostic techniques and parameters and their physiological significances (Special emphasis on ESR, Haematocrit, PCV, MCV, MCH, MCHC),  
Clinical implication of different components of blood (Special emphasis on anaemia, polycythemia, leucocytosis, leucopeniae, leucoma, purpura and erythroblastosis foetalis)  
Lymph: formation, circulation, and function; Edema.

**Unit II:**

Microscopic structure of nerve cells and glial cells,  
Myelinated and unmyelinated nerve fibers, Myelinogenesis,  
Excitation and conduction of nerve impulse, Resting membrane Potential, Action Potential, Electrotonic potentials, Ionic basis of excitation and conduction,  
Types of nerve fibers and functions,  
Properties of nerve fibers: excitability, contractility, all or none law, accommodation, adaptation, summation, refractive period, concept of chronaxie and rheobase,  
Neurotrophins- Definition, Chemical nature, and functions  
Degeneration and regeneration of nerve fiber,  
Sensory receptors as biological transducers, types, and properties, Receptor Potential.

**Unit III:**

Microscopic structure of striated, smooth & cardiac muscles, Sarcotubular system,  
Electrical phenomena and ionic fluxes in different types of muscles,  
Muscle proteins, Mechanism of muscle contraction and relaxation, Excitation-contraction coupling, isotonic and isometric contraction, Chemical, thermal, and electrical changes in muscle during contraction and relaxation,  
Properties of muscle: excitability, contractility, all or none law, summation of stimuli, summation of contractions, effects of repeated stimuli, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility & elasticity,  
Muscle fiber, Red and White striated muscle fiber, Single and multi-unit smooth muscle,

	<p>Spasticity and flaccidity of muscle, myasthenia gravis, rigor mortis, muscular dystrophy, hypotonia and hypertonia of muscle.</p> <p><b>Unit IV:</b>  Synapses: types, functional anatomy,  Synaptic transmission: Electrical events, chemical transmission; inhibition and facilitation at synapse,  Principal neurotransmitter systems, neuromodulators,  Neuromuscular junctions: functional anatomy, transmission mechanism, endplate potential,  Motor unit, Motor point.</p> <p><b>Practical:</b> <span style="float: right;"><b>02 Credit</b></span></p> <p>Preparation and staining of blood film,  Identification of blood corpuscles,  Differential Count of WBC,  Total Count of RBC and WBC,  Bleeding and Clotting time,  Blood group determination,  Haemoglobin estimation,  Preparation and staining of bone marrow.</p> <p>Isolation and staining of nerve fibers with node of Ranvier and muscle fibers,  Demonstration of skeletal muscle curve and calculation of latent period, contraction period, relaxation period, maximum height of contraction from supplied muscle curve,  Phenomenon of human fatigue by Mosso's Ergograph,  Examination of motor system: bulk (Inspection and palpation), tone (Hypotonia, hypertonia), strength (grading) of muscle.</p>
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Physiology 4 years Course		
<b>Semester I</b>		
<b>MDC 1</b>		Paper Name: <b>Nutritional Physiology</b>
<b>Total Credit-03 (Theory-03)</b>		
<b>Course Code</b>	<b>Subject of the Course</b>	
	<b>Theory: 03 credit</b> Basic constituents of food and their nutritional significances, Balance diets, Undernutrition, malnutrition and Overnutrition, Calorific value of foods, Body caloric requirements-ACU, Specific dynamic action (SDA), Respiratory quotient, Basic metabolic rate, Dietary requirements and nutritional roles of carbohydrate, protein, lipid, and other nutrients, Vitamins: Daily requirements, dietary source, physiological functions, deficiency symptoms, hypervitaminosis, antivitamins, Minerals: Daily requirements, dietary source, physiological functions, deficiency symptoms, Dietary fibers: dietary source, physiological functions, Physiology of starvation and obesity.	