

**REDUCED CBCS SYLLABUS**

**FOR**

**1<sup>st</sup>, 3<sup>rd</sup>, & 5<sup>th</sup> Semesters**

**3-Years UNDER-GRADUATE  
COURSE**

**IN**

**PHYSIOLOGY (HONOURS)**

**COOCHBEHAR PANCHANAN BARMA  
UNIVERSITY**

**COOCHBEHAR**

**WEST BENGAL**

**PIN 736101**

# Core Courses (Honours)

## Semester – I

### **3.1 Core T1 – Cellular Basis of Physiology**

[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]

#### **Unit 1**

1. Introduction
2. Organ Systems, Tissues - Special emphasis on connective tissue, areolar tissue, and Cells - ciliated epithelium and glandular cells.
4. Functional Morphology of Cell – Mitochondria, Ribosome, Lysosome, Golgi body and Endoplasmic Reticulum
5. Transport Across cell Membranes - Active, Passive, Carrier mediated, Antiport and Symport.

#### **Unit 2**

1. Cell Cycle – Different phases of cell cycles
2. Cell Division (basic idea)
3. Homeostasis – General concept of types of homeostasis.

### **3.2 Core P1 – Cellular Basis of Physiology Lab**

[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]

#### **List of Practical:**

1. Introduction on: Principle, use and function of different components of microscope.
2. Introduction on permanent slides - Applied value.
3. ***Study and Identification of Stained Sections of Different Mammalian Tissues and Organs:***  
Lungs, Spleen, Stomach, Duodenum, large Intestine, Liver, Kidney, Pancreas, Adrenal gland, Thyroid gland, Testes, Ovary, Spinal Cord, Cerebral cortex, Cerebellum, Uterus.

### **3.3 Core T2 – Biological Physics and Enzymes**

**[Theory: Credits 4 (4 Lectures /Week)/ Marks 25]**

#### **Unit 1**

1. Osmosis and Diffusion – Definition and Physiological importance.
2. Surface tension – Definition and Physiological importance.
3. Viscosity – Definition and Physiological importance.
4. Dialysis and Ultracentrifugation – Definition, Principle, Application.

#### **Unit 2**

1. Electrophoresis – Gel, SDS-Page - Principle, Technique, and Applied value.
2. Chromatography - Principle, Technique, Applied value of major types (Paper Chromatography, TLC, Ion-exchange).

#### **Unit 3**

1. A study of Enzymes:
  - a. Structure and classification, Coenzymes, Prosthetic Groups, Apoenzyme, Holoenzyme.
  - b. Mechanism of enzyme action
  - c. Hyperbolic and linear transformation enzyme Kinetics
  - d. Michaelis constant
  - e. Different types of Enzyme Inhibitions
  - f. Modulation of Enzymes Activities, feedback regulation, covalent modification
  - g. Factors regulating enzyme activities
  - h. Isoenzymes, Allosteric enzymes
  - i. Rate limiting enzymes – Definition and feature

### **3.4 Core P2 – Biological Physics and Enzymes Lab** **[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

#### **List of Practical**

1. Determination of Systolic, Diastolic, Pulse and Mean Blood Pressure by non-invasive methods (Auscultatory Method)

# **Semester – III**

## **3.9 Core T5 - Circulating Body Fluids**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

### **Concepts in theory**

1. Introduction
2. Blood – Components and general function.
3. White Blood Cells
4. Platelets
5. Red Blood Cells – Erythropoiesis, Hemoglobin-types.
6. Blood Types – Group and Rh typing.
7. Hemostasis – Definition, factors, modern concept and abnormalities in Hemostasis.
8. Lymph – Formation, circulation, Function.

## **3.10 Core P5 – Circulating Body Fluids Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

### **List of Practical**

1. Preparation and staining of blood film with Leishman's stain.
2. Identification of the blood corpuscles.
3. Differential count of WBC.
4. Bleeding time and clotting time.
5. Preparation of haemin crystal.
6. Blood group determination and Rh typing.

### **3.11 Core T6 – Circulation**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

#### **Origin of the Heart Beat and the Electrical Activity of the heart**

1. Introduction
2. Origin and Spread of Cardiac Excitation
3. The Electrocardiogram

#### **The Heart as a Pump**

1. Mechanical Events of the Cardiac Cycle
2. Cardiac Output - Definition, types, factors and measurement.

#### **Cardiovascular regulatory Mechanisms**

1. Local Regulatory Mechanisms
2. Substances Secreted by the Endothelium
3. Systemic Regulation by Hormones and Nervous system

#### **Circulation Through special Regions**

1. Cerebral Circulation
  - a. Anatomic Considerations
  - b. Cerebrospinal Fluid
  - c. The Blood-Brain Barrier
2. Anatomy, Regulation and Peculiarities of
  - a. Coronary Circulation
  - b. Circulation of the skin

#### **Cardiovascular Homeostasis in Health & Disease**

1. Effect of Exercise
2. Hypertension (in brief)
3. Heart Failure, stroke (in brief)

### **3.12 Core P6 – Circulation Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

#### **List of Practical**

1. Recording of systemic arterial blood pressure: Effect of posture and exercise.
2. Recording of 12-lead electrocardiogram. Computation of HR, PQ interval, QRS complex, PR interval from electrocardiogram -- Interpretation.

### **3.13 Core T7 - Functions of the Nervous System**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

#### **Reflexes**

1. Introduction of Reflex-Conditioned, Unconditioned, Monosynaptic, disynaptic and Polysynaptic. Reflex Arch- Component.
2. Monosynaptic Reflexes: The Stretch Reflex
3. Polysynaptic Reflexes: The Withdrawal Reflex

#### **Cutaneous, Deep & Visceral Sensory Pathways.**

1. Introduction of Neural Pathways-
2. Origin, Course, Termination and Function of
  - a) Temperature
  - b) Pain

#### **Arousal Mechanisms, Sleep, and the Electrical Activity of the Brain**

1. Introduction
2. The Thalamus and the Cerebral Cortex
3. The Electroencephalogram
4. Physiological Basis of the EEG, Consciousness, and Sleep

#### **Control of Posture and Movement**

1. Introduction
2. Posture and its regulation
3. Basal Ganglia
4. Cerebellum
5. Movement disorders

#### **The Autonomic Nervous System**

1. Introduction
2. Anatomic Organization of Autonomic Outflow
3. Chemical Transmission at autonomic Junctions
4. Responses of Effector Organs to Autonomic Nerve Impulses
5. Cholinergic and Adrenergic Discharge

## **Central Regulation of Visceral Function**

1. Introduction
2. Medulla Oblongata
3. Hypothalamus
  - a. Anatomic Considerations
  - b. Hypothalamic Function
    - Hunger
    - Thirst
    - Control of Posterior Pituitary Secretion
    - Control of Anterior pituitary Secretion
    - Temperature Regulation, fever

## **The Limbic System**

1. Introduction
2. Anatomic Considerations
3. Limbic Functions

## **Higher Functions of the Nervous System**

1. Introduction
2. Learning – General concept and Memory – Short term and Long term

## **3.14 Core P7 – Functions of the Nervous System Lab** **[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

### **List of Practical**

1. Experiments on superficial (plantar) and deep (knee jerk) reflex
2. Reaction time by stick drop test
3. Two-point discrimination test

# **Skill Enhancement Course**

## **5.1 SEC P1 – Hematological Techniques**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 40]**

### **List of practical**

1. Preparation of blood smear and identification of blood cells.
2. Determination of hematocrit, MCV, MCH, MCHC, bleeding time, clotting time etc.
3. Measurement of hemoglobin in blood.
4. Preparation of serum.



# Semester – V

## **3.21 Core T11 - Special Senses**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

### **Vision**

1. Anatomic Considerations – Eye.
2. The Image-Forming Mechanism (accommodation and visual acuity)
3. The Photoreceptor Mechanism: Genesis of Electrical Responses
4. Visual Pathways and effects of lesions of these pathways
5. Color Vision

### **Hearing and Equilibrium**

1. Anatomic considerations
2. Hair cells
3. Mechanism of hearing
4. Vestibular function
5. Audiometry

### **Smell and Taste**

Smell-

- Receptors and Pathways
- Physiology of Olfaction

Taste-

- Receptor Organs and Pathways
- Physiology of Taste, Taste adaptation

## **3.22 Core P11 – Special Senses Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

### **List of Practical**

1. Principles of fixation and staining.
2. Staining and identification of fixed nervous tissue.
3. Determination of visual acuity by Snellen's chart / Landolt's C chart.

## **3.23 Core T12 – Endocrinology**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

### **Unit 1**

#### **The Thyroid Gland**

1. Anatomic Considerations
2. Formation and Secretion of Thyroid Hormones
3. Effects of Thyroid Hormones
4. Regulation of Thyroid Secretion
5. Clinical Correlation.

#### **Endocrine Functions of the Pancreas and the Regulation of Carbohydrate Metabolism**

1. Islet Cell Structure
2. Structure, Biosynthesis, and Secretion of Insulin
3. Effects of Insulin
4. Mechanism of action
5. Regulation of Insulin Secretion
6. Glucagon
7. Hypoglycemia and Diabetes Mellitus in Humans

#### **The Adrenal Medulla and Adrenal Cortex**

- 1 Adrenal Medulla
  - a. Structure and Function of Medullary Hormones
  - b. Regulation of Adrenal Medullary Secretion
4. Adrenal Cortex
  - a. Structure and Biosynthesis of Adrenocortical Hormones

### **Unit 2**

#### **Hormonal Control of Calcium Metabolism and the Physiology of Bone**

1. Introduction
2. Calcium and Phosphate Metabolism
3. Vitamin D and the Hydroxycholecalciferols
4. The Parathyroid Glands
5. Calcitonin

## **The Pituitary Gland**

1. Morphology
2. Posterior pituitary hormones
3. Growth Hormone
4. Pituitary Hypo- and Hyper-functions in Humans

## **Endocrine Functions of the Pineal Gland**

1. Pineal Gland
2. Human chronobiology, biological rhythms; basic concepts and implication.

### **3.24 Core P12 – Endocrinology Lab** **[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

#### **List of Practical**

1. Growth chart and interpretation.
2. Staining and identification of fresh sections of endocrine glands.

# Discipline Specific Elective Courses

## **4.1 DSE T1 – Microbiology and Immunology**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

### **Microbes**

1. Bacterial cell Structure and morphological classification.
2. Different Staining techniques - Gram positive, gram negative, pathogenic and nonpathogenic bacteria.
3. Bacterial culture medium and culture techniques,
4. Sterilization, pasteurization.
5. Nutritional requirements of bacteria, Bacterial growth curve, factors affecting bacterial growth.
6. Brief idea about antibiotics, elementary idea of bacteriostatic and bactericidal agents.

### **Overview of Immune System**

1. Idea about innate and acquired immunity.
2. Humoral and cell mediated immunity.
3. Antigen, Hapten and Super antigen Antigen-antibody interactions :Application in diagnosis of disease.
4. Immunoglobulin - classification, basic structure and function. Polyclonal and Monoclonal antibody
5. Antigen presentation. Major Histocompatibility Complex (MHC)-Type-I&II.
6. Vaccination – Principles, Universal protocol on Immunization, primary and secondary reaction of vaccination, health reaction due to vaccination, memory cell formation due to vaccination and importance of immunization.
7. Immunopathology - basic principles of autoimmune disease.
8. Hybridoma Technology, RIA, ELISA.

## **4.2 DSE P1 – Microbiology and Immunology Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

### **List of Practical**

1. Gram staining of bacteria and identification of Gram positive and Gram negative bacteria.
2. Haemagglutination test with antibodies of A, B, and D antigen.

### **4.3 DSE T2 – Genetics and Molecular Biology**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

#### **Genetics**

Basic principles of Mendelian genetics - monohybrid and dihybrid, test and back crosses, Extension of Mendelism - Epistasis and its different types present in plants and animals. Penetrance, expressivity, pleiotropism. Crossing over and molecular recombination, Numerical and Structural variations in chromosome- autosomal and sex chromosomal anomalies - basic concepts of aneuploids and polyploids. Blood group genetics.

#### **Molecular Biology**

Genes - definition. Chromosome and chromatin structure and molecular organization, DNA- structure, DNA replication, transcription of RNA in prokaryotes, Genetic code – properties and wobble hypothesis, translation in prokaryotes, regulation of gene expression – Operon concept: lac operon, chromosomal aberrations and gene mutations, Basic concepts, principles and applications of Colony hybridization, in situ hybridization, Dot Blot, Southern, Northern, Western Blotting Techniques, Polymerase chain reaction.

### **4.4 DSE P2 – Genetics and Molecular Biology Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

#### **List of Practical**

1. Retrieval of amino acid sequence from mRNA.
2. Retrieval of codogen in DNA from codon sequence of mRNA.

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# **Core Courses**

## **SEMESTER – I**

### **2.1 CC-1A T1– Physiological Aspect of Community Health**

**[Theory: Credits 4 (4 Lectures/Week)/Marks 25]**

#### **Concepts in theory**

1. Basic idea about community health and public health issues, Malnutrition in a community, over nutrition, issues of obesity; possible remedial measures.
2. Concept of ACU, Calorie requirement.
3. Diet management of obese, diabetic, hypertensive person.
4. Basic idea on PCM, marasmus, kwashiorkor and their prevention. Iron and iodine deficiency.

### **2.2 CC –1A P1– Physiological Aspect of Community Health Lab**

**(Practical: Credits 2/ Marks 20)**

#### **List of Practical**

1. Assessment of dietary status of family members.
2. Report on Immunization Programme in India.

## **SEMESTER - III**

### **2.5 CC-1C T3– Environmental Hazards and Human Physiology**

**[Theory: Credits 4 (4 Lectures/Week)/Marks 25]**

#### **Air Pollution**

Definition, sources, air pollutants, effects of air pollution on human health, concept of ozone hole, green house effects and global warming.

#### **Water Pollution**

Definition, types, health hazards, water pollutants, biochemical oxygen demand (BOD), concept of safe drinking water standards.

#### **Soil Pollution**

Causes, health hazards.

#### **Sound Pollution**

Definition, concept of noise, source of sound pollution, effects of sound pollution on human health, noise index (noise standards).

### **2.6 CC-1C P3– Environmental Hazards and Human Physiology Lab**

**(Practical: Credits 2/ Marks 20)**

#### **Physiological Experiments**

1. Measurement of dissolve oxygen.
2. Measurement of noise by sound level meter
3. Measurement of pH of soil.

## **Skill Enhancement Course**

### **4.1 SEC P1 – Food Pollutants Lab**

**[Practical: Credits 2/(4 Practical Classes/Week)/Marks 40]**

#### **Qualitative tests for Food Adulteration**

Qualitative tests for identifying Food Adulterants in some food samples:

Metanil yellow, Saccharin, Monosodium glutamate, Aluminium foil, Chocolate Brown HT, Margarine in turmeric powder, besan, laddoo, noodles, chocolate and amriti.



# **SEMESTER - V**

## **Discipline Specific Elective Course**

### **3.1 DSE T1: Clinical Microbiology and Immunology**

**[Theory: Credits 4 (4 Lectures/Week)/Marks 25]**

#### **Microbes**

1. Structure and morphological classification.
2. Gram positive, gram negative, pathogenic and nonpathogenic bacteria. Sterilization, pasteurization.
3. Elementary idea of antibiotics- bacteriostatic and bactericidal agents.

#### **Overview of immune system**

1. Idea about innate and acquired immunity.
2. Humoral and cellular immunity.
3. Antigen.
4. Immunoglobulin - classification, basic structure and function.
5. Vaccination - principles and importance of immunization.
6. Immunopathology - basic principles of AIDS.

### **3.2 DSE P1: – Clinical Microbiology and Immunology Lab**

**[Practical: Credits 2/(4 Practical Classes/Week)/Marks 15]**

#### **List of Practical**

1. Gram staining of bacteria and identification of Gram positive and Gram negative bacteria.
2. Direct Haemagglutination test with antibodies of A, B and D antigen.

## **Skill Enhancement Course**

### **4.4. SEC T1 – Clinical Microbiology and Laboratory Medicine**

**[Theory: Credits 2 (2 Lectures/Week)/Marks 25]**

#### **Concepts in theory**

1. Staining of gram positive and gram-negative bacteria.
2. ECG Machine - Working principle, procedure of recording and applied value.
3. Handling of Doctor's centrifuge.

# Generic Elective Course

## **6.5 GE T3 – Environmental Pollution and Human Health**

**[Theory: Credits 4 (4 Lectures/Week)/ Marks 25]**

### **Air Pollution**

Definition, sources, air pollutants, effects of air pollution on human health, concept of ozone hole, green house effects and global warming.

### **Water Pollution**

Definition, types, health hazards, water pollutants, biochemical oxygen demand (BOD), concept of safe drinking water standards.

### **Soil Pollution**

Causes, health hazards.

### **Sound Pollution**

Definition, concept of noise, source of sound pollution, effects of sound pollution on human health, noise index (noise standards).

## **6.6 GE P3 – Environmental Pollution and Human Health Lab**

**[Practical: Credits 2/ (4 Practical Classes/Week) /Marks 15]**

### **Physiological Experiments**

1. Measurement of dissolve oxygen.
2. Measurement of noise by sound level meter
3. Measurement of pH of soil.