

**DEBRA THANA S.K.S. MAHAVIDYALAYA
(AUTONOMUS)**

Chakshyampur, Debra, Paschim Medinipur, West Bengal



PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

**BACHELOR OF SCIENCE WITH PHYSIOLOGY
(MULTI DISCIPLINARY STUDIES)**

3-YEAR UNDERGRADUATE PROGRAMME
(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate

Programmes (CCFUP), 2023 & NEP, 2020

DEBRA THANA S.K.S. MAHAVIDYALAYA
(AUTONOMOUS)
BACHELOR OF SCIENCE IN LIFE SCIENCES with PHYSIOLOGY
(Under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks				
								CA	ESE	TOTAL		
B.Sc. in Life Sc. with Physiology	1 st	I	SEMESTER-I									
			Major (Disc.-A1)	PHYPMJ101	T: Basic Human Physiology P: Practical <i>(To be studied by the students taken Physiology as Discipline-A)</i>	4	3-0-1	15	60	75		
			SEC	SEC01	Modern techniques of Human Physiology (Practical)	3	0-0-3	10	40	50		
			AEC	AEC01	Communicative English-1 (<i>common for all programmes</i>)	2	2-0-0	10	40	50		
			MDC	MDC01	Multidisciplinary Course-1 (<i>to be chosen from the list</i>)	3	3-0-0	10	40	50		
			VAC	VAC01	VAC-01: ENVS (<i>common for all programmes</i>)	4	2-0-2	50	50	100		
			Minor (Disc.-C1)	PHY MI 01/C1	T: Basic Human Physiology; P: Practical <i>(To be studied by the students taken Physiology as Discipline-C)</i>	4	3-0-1	15	60	75		
		Semester-I Total						20				400
		II	SEMESTER-II									
			Major (Disc.-B1)		<i>To be decided</i> <i>(Same as like A1 for students taken Physiology as Discipline-B)</i>	4	3-0-1	15	60	75		
			SEC	SEC02	<i>Nutrition and Dietetics (Practical)</i>	3	0-0-3	10	40	50		
			AEC	AEC02	MIL-1 (<i>common for all programmes</i>)	2	2-0-0	10	40	50		
			MDC	MDC02	Multidisciplinary Course-02 (<i>to be chosen from the list</i>)	3	3-0-0	10	40	50		
			VAC	VAC02	VAC-02 (<i>to be chosen from the list</i>)	4	4-0-0	10	40	50		
			Minor (Disc.-C2)	PHY MI 02/C2	T: Biophysical, Biochemical principles and metabolism; P: Practical <i>(To be studied by the students taken Physiology as Discipline-C)</i>	4	3-0-1	15	60	75		
			Summer Intern.	CS	Community Service	4	0-0-4	-	-	50		
		Semester-II Total						24				400
		TOTAL of YEAR-1						44	-	-	-	800

P MJ= Major Programme (Multidisciplinary), MI = Minor, A/B = Choice of Major Discipline; C= Choice of Minor Discipline; SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

MJ A1/B1: Basic Human Physiology.

Credits 04 (FM: 75)

MJ A1/B1T: Basic Human Physiology

Credits 03 [45L]

Course contents:

Unit-I: Cellular Physiology:

Concept of eukaryotic and prokaryotic cell, Electron microscopic structure and functions of the organelles of eukaryotic cells: Structure of plasma membrane - Bio-chemical components, their arrangement, membrane asymmetry and fluidity; Functions; Fluid mosaic model. Membrane transport: active and carrier mediated transport; Mechanism of exocytosis and endocytosis. Structure functions of ion channels. Endoplasmic reticulum: EM structure and functions of smooth and rough ER. Microsomes: basic functional aspects. Golgi complex: structure, its storage and processing functions. Lysosomes and its functions. EM structure and functions of nucleus. Peroxisomes and its function. Mitochondria: EM structure and its functions. EM structure of nucleus-structure of nuclear membrane and nucleolus. Ribosomes – EM structure and functions.

Unit-II: Blood, body fluid and immune System:

Blood, body fluid: Basic idea of intracellular and extracellular body fluid. Volumes of body water in different compartments. Water balance and its regulation. Dehydration and edema. Composition, properties and functions of blood, blood cell formation and related disorders, Blood transfusion and its hazards, Blood clotting (types), mechanism; Blood volume: Definition, Determination of blood volume, factors influencing blood volume, regulation of blood volume; Erythropoiesis: Definition, steps of erythropoiesis, role of different factors on erythropoiesis; Platelets: Structure, functions. Significance of platelets counts. Haemoglobin: Structure, properties and functions of haemoglobin. Abnormal haemoglobin. Blood grouping: The ABO systems, The Rh systems and erythroblastosis fetalis, The MN system.

Fundamental concept of Immune System: Overview of Immune System - properties of immune system; types of immunity: innate immunity, acquired immunity, active and passive immunity. First and second line defence. Immuno-competent Cells- Structure and functions of Neutrophil, B-lymphocytes, T-lymphocytes (helper, cytotoxic and suppressor), Natural Killer (NK) cells, monocytes, macrophages. Primary and secondary lymphoid organs. Concept of antigen and antibody. Properties of immunogen, haptens and adjuvants. Classification, structure and functions of immunoglobulins (IgG, IgM, IgA, IgD, IgE). Concept about immunization, Immunization schedules - National and WHO.

Unit-III: Cardiovascular System: Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Structure of arteries, arterioles, capillaries, venules and veins. Cardiac valves, Heart Block. Heart rate and its regulations. Bradycardia and tachycardia. Heart sounds. Frank–Starlings laws of heart. Blood Pressure- Definition, types, Factors affecting blood pressure, Role of Renin- angiotensin system, Vasopressin or ADH in Blood Pressure

regulations. Cardiac output –Definition, methods of determination (dye dilution and Fick principle) and factors affecting on it; Cardiac cycle: Definition & Events.

Unit IV: Physiology of Respiratory system: Introduction, anatomical structure and functions of the lungs. Basic concepts about respiratory tract, respiratory muscles and their innervations. Mechanism of respiration; Mechanics of breathing. Role of respiratory centres, central and peripheral chemoreceptors. Gas (CO₂ and O₂) transport mechanism in the lungs; CO₂ and O₂-dissociation curve, factors affecting; Respiratory acidosis and alkalosis; non-respiratory functions of lungs. Concept of lung Compliance, surfactants, elasticity and elastic recoil of the lung. Artificial respiration. Respiratory failure. Different lung volume and capacities; Lung Function Tests. Hypoxia, O₂ toxicity; Asphyxia: definition, cause, sign and symptoms.

Unit V: Overview of digestive system:

Different parts and functions of gastrointestinal (GI) tract. Digestive glands and their functions. Composition and functions of digestive juice including bile.

MJ A1/B1P: Practical

Credits 01

Course

1. Fresh tissue experiments:

- a) Study of compound microscope.
- b) Examination & staining of fresh tissue: squamous, ciliated & columnar epithelium, skeletal muscle fibre (Rat/ Goat) by Methylene blue stain.
- c) Transitional epithelium, mesentery (Rat/ Goat) (counter stain by Methylene blue)

2. Hematology:

- a) Preparation of blood film of your own blood. Staining of the blood film with Leishman's stain.
- b) Identification of different types of blood corpuscles.
- c) Determination of TC of RBC and WBC by haemocytometer.
- d) Differential count of WBC.
- e) Determination of ESR of human blood.
- f) Estimation of haemoglobin by haemoglobinometer.
- g) Preparation of haemincrystals.
- h) Determination of Blood groups.
- i) Determination of clotting time, bleeding time.

3. Human Experiment:

- a) Measurement of arterial blood pressure by Sphygmomanometer test, Calculate the mean arterial blood pressure (MABP).
- b) Measurement of heart rate and pulse rate (30 beats methods) during rest condition.
- c) Study of blood pressure.
- d) Study of pulse rate as an effect of breath-holding.
- e) Determination of Physical Fitness Index (PFI) of an Individual by Modified Harvard Step test.

SKILL ENHANCEMENT COURSE (SEC)

SEC 1P: Modern techniques of Human Physiology (Practical) Credits 03 (Full Marks: 50)

Course Outline:

Modern techniques of Human Physiology (Practical)

Unit: 1: **20**

- 1) Basic idea of spectrophotometer
- 2) Hematological Analyzer
- 3) Electrolyte Analyzer
- 4) Hemoglobin Estimation by Spectrophotometer
- 5) ECG recording analysis
- 6) Spirometer
- 7) Pulse Oximeter

Unit: 2: **20**

Study of modern techniques in Higher Institute/Hospital/Pathological Laboratories.

SEC 2P: Nutrition and Dietetics (Practical) Credits 03 (Full Marks: 50)

Course Outline:

Practical:

Diet Survey: Nutritional assessment as per ICMR specification (Steps- Introduction, Diet History, Methodology, Dietary Survey on the status of dietary intake in the surrounding area through visits or Field visit at different high-altitude area or sea level surrounding community populations, Clinical Examinations, Remarks, Recommendation and Conclusion. Each student has to prepare and submit the report preferably regarding the diet survey or field.

MINOR (MI)

MI 1/C1: Basic Human Physiology.

Credits 04 (FM: 75)

MI 1/C1T: Basic Human Physiology.

Credits 03[45L]

Course contents:

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capillaries, venules and veins. Cardiac valves, Heart Block. Heart rate and its regulations. Bradycardia and tachycardia. Heart sounds. Frank–Starlings laws of heart. Blood Pressure- Definition, types, Factors affecting blood pressure, Role of Renin- angiotensin system, Vasopressin or ADH in Blood Pressure regulations. Cardiac output –Definition, methods of determination (dye dilution and Fick principle) and factors affecting on it; Cardiac cycle: Definition & Events.

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Unit V: Overview of digestive system:

Different parts and functions of gastrointestinal (GI) tract. Digestive glands and their functions. Composition and functions of digestive juice including bile.

MI 1/C1 P: Practical

Credits 01

Course

1. Fresh tissue experiments:

- a) Study of compound microscope.
- b) Examination & staining of fresh tissue: squamous, ciliated & columnar epithelium, skeletal muscle fiber (Rat/ Goat) by Methylene blue stain.
- c) Transitional epithelium, mesentery (Rat/ Goat) (counter stain by Methylene blue)

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MI-2/C2: Biophysical, Biochemical principles and Metabolism

Credits 04 (Full Marks: 75)

MI-2/C2 T: Biophysical, Biochemical principles and Metabolism

Credits 03

Course contents:

Unit I: Biophysical Principles:

Physiological importance of the following processes: diffusion, osmosis, dialysis, ultrafiltration, surface tension viscosity, adsorption, absorption. Brief idea about pH, buffer and maintenance of pH in the body. Brief idea about colloids. Enzyme- definition, classification, factors affecting enzyme action. Concept of co-enzyme, isoenzyme. Colloids: properties and significances, electrokinetic properties; Isoelectric pH and isoelectric precipitation. Gibbs-Donnan membrane equilibrium and its biological importance. Acids and bases as proton donors and acceptors.

Unit II: Chemistry of Biomolecules and metabolism:

Carbohydrates: Definition and Classification, structure, stereoisomerism, optical isomerism, optical activity, epimerism. Derivatives of monosaccharides: Amino sugars, deoxy sugars, sugar alcohols, sugar acids, sugar esters, their biochemical and physiological importance. Disaccharides - Maltose, Lactose and Sucrose: Occurrence, Structure, bio-chemical properties and Physiological importance. Polysaccharides - Starch, Glycogen, Dextrin, Cellulose, Glycosaminoglycans, Glycoproteins.

Peptides and Proteins: Structure and properties of peptide bonds. Different levels of protein structure - Primary, Secondary (α -helix and β -pleated sheet), Tertiary and Quarternary. Forces stabilizing the structures (Covalent bonds, Ionic and hydrogen bonds, Van-derWaals forces and hydrophobic interactions). Amino acids: Classification, Structure, Nomenclature and Optical properties. Zwitterions and Isoelectric point. Nucleic acids: Nucleosides and Nucleotides - structure. Polynucleotides. DNA double helix - Primary, Secondary and Tertiary structure. Purine and Pyrimidine: Structure, nomenclature and tautomerism.

Lipids: Definition and classification. Fatty acids: Classification and structure. Properties of Fat and Fatty acids -Hydrolysis, Saponification, Saponification number, Iodine number.

Digestion and absorption of carbohydrates, lipids, proteins; Glycolysis, TCA cycle. Fatty acid oxidation.

MI 2/C2 P: Practical

Credits 01

- i) Measurement of PH of various solutions using pH indicators and meter.
 - ii) Preparations and study the properties of different buffer solutions.
 - iii) Biochemistry (Qualitative and Quantitative assay)
 - Qualitative analysis of carbohydrate- Glucose, Fructose, Sucrose, Lactose, Starch, Proteins- Albumin, Gelatin, Acetone, Bile salt, Glycerol, HCl.
 - Quantification of glucose, lactose and sucrose in a specific sample.
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