

VIDYASAGAR UNIVERSITY

Midnapore, West Bengal



PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

**BACHELOR OF SCIENCE WITH PHYSIOLOGY
(MULTIDISCIPLINARY STUDIES)**

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

Based on

**Curriculum & Credit Framework for Undergraduate Programmes
(CCFUP), 2023 & NEP, 2020**

VIDYASAGAR UNIVERSITY
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	SEMESTER-I									
		I	Major (Disc.-A1)	PHYPMJ101	T: Fundamentals of body fluids, Immunity, Circulation and Respiration P: Hematology and Human Experiment <i>(To be studied by the students taken Physiology as Discipline-A)</i>	4	3-0-1	15	60	75	
			SEC	SEC01	<i>To be chosen from SEC-01 of Discipline A/B/C of their Hons. prog.</i>	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 MI01/C1	T: Introduction to Physiology-I; 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
		SEMESTER-II									
		II	Major (Disc.-B1)		<i>To be decided (Same as like A1 for students taken Physiology as Discipline-B)</i>	4	3-0-1	15	60	75	
			SEC	SEC02	<i>To be chosen from SEC-02 of Discipline A/B/C of their Hons. prog.</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	Multi Disciplinary 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 MI02/C2	T: Introduction to Physiology-II; 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-I						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

MAJOR (AD)

→ AC

→ SD

MAI/AI/BI: Fundamentals of body fluids, Immunity, Circulation and Respiration Credits 04 (FM: 75)

MAI/AI/BIT: Fundamentals of body fluids, Immunity, Circulation and Respiration Credits 03 [45L]

Course contents:

Unit-I Blood, body fluid and immune System:

Blood, body fluid: Basic idea of intracellular and extracellular compartments of body fluid. Water: intake and excretion. Volumes of body water in different compartments and their estimation. Water balance and its regulation. Dehydration and edema. Composition, properties and functions of blood, blood cell formation and related disorders. Blood groups. Blood transfusion and its hazards. Blood clotting (types), anti-clotting mechanism and blood disorders: Blood volume: Normal value, Determination of blood volume, variation and maintenance of blood volume. Effective blood volume, factors influencing blood volume, regulation of blood volume; Erythropoiesis: Definition, steps of erythropoiesis, role of different factors on erythropoiesis; Platelets: Structure, functions. Platelet's reaction. Critical counts of Platelets. Significance of platelets counts. Haemoglobin: Structure, properties and functions of haemoglobin. Abnormal haemoglobin. Bone marrow: synthesis, functions. Blood grouping: The ABO systems. The Rh systems, 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, Tlymphocytes (helper, cytotoxic and suppressor). Natural Killer (NK) cells, monocytes macrophages. Primary and secondary lymphoid organs. Antigen-Antibody: Properties of immunogen, antigens and haptens. Classification, structure and functions of immunoglobulins (IgG, IgM, IgA, IgD, IgE). Acquired Immunodeficiency: AIDS, The HIV virus & infection; immunological events associated with HIV infection. Immunization: Concept about immunization, Immunizing agent- vaccine, antisera, DNA vaccine, edible vaccine. Immunization schedules - National and WHO.

Unit-II: Cardiovascular System: Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Properties of cardiac muscle, origin & propagation of cardiac impulse. Structure of arteries, arterioles, capillaries. Venules and veins. Heart Block, basic idea about artificial pacemaker. Cardiac valves. Heart rate and its regulations. Heart sounds. Nerves and its role in the regulation of the heart function. Frank-Starlings laws of heart. Blood Pressure- Definition, Factors affecting blood pressure; Regulation: Chemical and Neural; Cardiac output - factor affecting; Heart rate- regulation, bradycardia, tachycardia; Types of blood pressure: Hypertension and hypotension; Cardiac cycle: Events of cardiac cycle, Heart rate, Heart Sound, Heart rate control, factors affecting and regulation. Cardiac output: methods of determination (dye dilution and Fick principle), factors affecting regulation. Role of Renin- angiotensin system, Vasopressin or ADH in Blood Pressure regulations.

Unit-III: Physiology of Respiratory system: Introduction, anatomical structure and functions of the lungs. Basic concepts about respiratory tract, histology of lungs, respiratory muscles and their innervations. Mechanism of respiration: Regulation 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, clinical application; Respiratory acidosis and alkalosis; non-respiratory functions of lungs. Compliance, elasticity and elastic recoil of the lung. Role of lung surfactants. Lung compliance; Artificial respiration. Respiratory failure. High altitude sickness. Different lung volume and capacities; Lung Function Tests. Hypoxia: Types and causative factors: Oxygen treatment, O₂ toxicity; Asphyxia: definition, cause, sign and symptoms.

VIDYASAGAR UNIVERSITY, PASCHIM MIDNAPORE, WEST BENGAL

AC → Anisla Chakrabarty
SD → Sulepa Das

III: Hematology and Human Experiment (Practical)

→ SP

→ AC Credits 01

Course Outlines

Practicals

- 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 haemin crystals.
- h) Determination of Blood groups.
- i) Determination of clotting time, bleeding time, prothrombin time.

P, D.

Theory 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 with the changes of postures (Standing, Supine, Sitting).
- d) Study of pulse rate as an effect of breath-holding.
- e) Study of pulse rate with the variation of static work load.
- f) Determination of Physical Fitness Index (PFI) of an Individual by Modified Harvard Step test.

A.C.

SKILL ENHANCEMENT COURSE (SEC)

SEC 1P: Clinical Hematology (Practical)

Credits 03 (Full Marks: 50)

Course Outline:

Concept of Clinical Haematology:

AC. } Anemia and its classification. Laboratory investigation and management of anemia. Iron deficiency anemia, megaloblastic anemia, pernicious anemia- pathogenesis and laboratory investigation. Reticulocytes. Aplastic anemia- laboratory diagnosis. Bone marrow examination. Aspiration techniques. Hemoglobin - abnormal hemoglobin. Hemolytic anemia and its laboratory investigation. Haemoglobinopathies. Hemoglobin electrophoresis. Sickle cell anemia, Thalassemia laboratory diagnosis. Blast cell. Causes and significances of leucocytosis, leucopenia, neutrophilia, eosinophilia, basophilia, monocytosis, lymphocytosis, neutropenia, lymphopenia. Toxic granulation. Leukemia and its classification. HIV on blood cell parameters. LE cells and its significances. Blood parasites. Hemostasis and Coagulation: Platelet development. Qualitative and quantitative disorders of platelets. Secondary hemostasis. Hemophilia, Willebrand diseases. Disorder of fibrinogen. Fibrinolysis. Bleeding and coagulation disorders. Blood groups: Immunological basis of identification of ABO and RH blood groups. Biochemical basis of ABO system and Bombay phenotyping. Others blood groups: Kell, Kidd, Duffy, etc. Blood transfusion. Blood banking. Definition determination and significance of TC, DC, ESR, Arnth count, PCV, MCV, MHC, MCHC. bleeding time, clotting time, prothrombin time. SD. }

Practical:

- SD. AC. }
1. General blood film preparation by Leishman stain,
 2. Differential leucocyte count, RBC, WBC count and platelet count.
 3. Determination of haemoglobin by various methods
 4. Determination of ESR, PCV, MCV, MCH, MCHC and red cell indices.
 5. Staining of bone marrow
 6. Determination of blood groups.
 7. Demonstration of thrombin time.
 8. Demonstration of malarial parasite identification.

SEC 2P: Nutrition and Dietetics (Practical)

Credits 03 (Full Marks: 50)

Course Outline:

Concept of Nutrition and Dietetics:

Basic concept: Nutrition, Nutrients, Nutraceutical, Cosmeceutical, Nutrigenomics. Nutritional Evaluation of Carbohydrates: Glycemic Index (GI), Classification of dietary fibers with potential of health benefit, Resistance starch. Nutritional Evaluation of Proteins: Essential and Non-essential amino acids, Protein Efficiency ratio (PER), nitrogen balance, Net protein utilization (NPU), Biological value of protein, protein spares, Nutritive value of major food groups (basic concepts). Vitamins: Water soluble vitamins (Vit-B complex, Vit-C, Folic acid) and fat-soluble vitamins (Vit-A, D, E and K): source, brief chemistry, dietary requirements, functions, deficiency, hyper-vitaminosis, and antioxidant. Energy in Human Nutrition: Basic concept of energy and units, calorific and physiological fuel value, respiratory quotient (RQ), Total energy expenditure (TEE), Basal metabolic rates (BMR) and Resting energy expenditure (REE), Specific dynamic action (SDA), physical activity ratio (PAR), Determination of BMR by

Ability Enhancement Course (AEC)

Ability Enhancement Course (AEC) - 01

AEC-1T: Communicative English-01

Credits 02 (Full Marks-50)

Course Contents:

1. **Communication Skills**
 - a) Types and Models of Communication
 - b) Verbal and Non-verbal Communication
 - c) Barriers and Strategies
 - d) Inter-personal Communication
2. **Listening Skills:**
 - a) Active and Passive Listening
3. **Speaking Skills:**
 - a) Different forms of Speaking – Formal/Informal
 - b) Group Discussion
 - c) English in Situations: Greeting & Leave Taking, Making & Granting/Refusing Requests, Queries & Giving Information/Direction, Describing objects/process, Narrating events & Commentary, Persuasion & Motivation, Complaints & Apologies, Expressing disapproval, Alerting & Warning
4. **Reading Skills:**
 - a) Different types of Reading
 - b) Comprehension

Suggested Readings:

1. *A Textbook of English and Communication Skills*. Richa Mishra and Ratna Rao, New Delhi: Macmillan: 2019
2. *Many Coloured Glass*. Board of Editors, Department of English, Vidyasagar University, Delhi: Macmillan, 2013.
3. *Connect: Course in Communicative English*, Debashis Bandyopadhyay & Malathi Krishnan, Cambridge University Press, New Delhi, 2018.

VIDYASAGAR UNIVERSITY, PASCHIM MIDNAPORE, WEST BENGAL

→ AC
→ SD
→ SM

Value Added Course (VAC)

Value Added Course (VAC)- 01

VAC-01: ENVIS- Environmental Studies

Credits 04 (Full Marks-100)

Course contents:

Unit-I: Introduction to environmental studies

(2 lectures)

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Unit-II: Ecosystems

(6 lectures)

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem; b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-III: Natural Resources: Renewable and Non-renewable Resources

(8 lectures)

- Land resources and land use change; Land degradation, soil erosion and desertification;
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Joint forest management.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & interstate).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit-IV: Biodiversity and Conservation

(8 lectures)

- Levels of biological diversity: genetic, species and ecosystem diversity; Bio-geographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit-V: Environmental Pollution

(8 lectures)

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.
- Noise pollution.

VIDYASAGAR UNIVERSITY, PASCHIM MIDNAPORE, WEST BENGAL

AC → Annila Chakrabarty / SM → Sanatan Manna
SD → Sutapa Das

Unit-VI: Environmental Policies & Practlees

(7 lectures)

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.
- Environmental policy and gender issues

Unit-VII: Human Communities and the Environment

(6 lectures)

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi)

Unit-VIII: Field work

(Equal to 5 lectures)

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site--Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems--pond, river, Delhi Ridge, etc.
- Disaster management.
- Coastal ecosystem

Suggested Readings:

- i. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- ii. Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
- iii. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
- iv. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- v. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
- vi. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*. 339: 36--37.
- vii. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29--64). Zed Books.
- viii. McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
- ix. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
- x. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic Press
- xi. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- xii. Raven, P.H., Hassenzahl, D.M. & Berg. L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.

VIDYASAGAR UNIVERSITY, PASCHIM MIDNAPORE, WEST BENGAL