

VIDYASAGAR UNIVERSITY



Curriculum for 3-year B.Sc. (General)

Physiology

**Revised Syllabus under CBCS
(w. e. f. 2022-2023)**

**Vidyasagar University
Midnapore 721102
West Bengal**

Vidyasagar University

Curriculum for B.Sc. (General) in Physiology [Revised Syllabus w.e.f. 2022-23]

SEMESTER-I

Course Structure

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC1 [DSC-1A]		DSC-1AT: Cellular Physiology, Biophysical Principles, Biochemistry, Digestive system & Metabolism	Core Course-1	4	0	4	6	75
		DSC-1AP: Fresh tissue experiments & Identification of permanent slides						
CC2 [DSC-2A]		DSC-2A: TBD <i>(from other Discipline)</i>	Core Course-2				6	75
CC3 [DSC-3A]		DSC-3A: TBD <i>(from other Discipline)</i>	Core Course-3				6	
AECC (Elective)		English	AECC (Elective)	1	1	0	2	50
Semester Total							20	275

L=Lecture, **T**=Tutorial, **P**=Practical, **CC** = Core Course, **TBD** = To be decided, **AECC (Elective)** = Ability Enhancement Compulsory Course (Elective)

DSC-1 = Discipline Specific Core of Subject-1, **DSC -2** = Discipline Specific Core of Subject-2, **DSC -3** = Discipline Specific Core of Subject-3

SEMESTER- I

DSC-1A (CC-1): Cellular Physiology, Biophysical Principles, Biochemistry, Digestive system & Metabolism
Credits 06

DSC1AT: Cellular Physiology, Biophysical Principles, Biochemistry, Digestive system & Metabolism
Credits 04

Course Contents:

• Cellular Physiology and Biophysical Principles

Membrane physiology: structure and functions of cell- Endoplasmic reticulum, Golgi complex, Peroxisome, Mitochondria, Ribosome.

Tissue- Structure, classification, distribution and function of different human tissues. Physicochemical principles and Physiological importance of: Diffusion, Osmosis, Adsorption, Absorption, pH and buffers, Colloids.

Enzymes - classification, coenzymes, factors affecting enzyme action, Isozymes.

• Biochemistry and Metabolism:

Carbohydrates : classification , structure and properties

Proteins : Classification , order of structure (elementary idea), Amino acids: classification and properties **Lipids** : classification. Fatty acids – Classification, and properties, lipoprotein – Classification and structure **Nucleic acid** – structure of DNA and RNA

Vitamins – classification and functions. Minerals – functions of Sodium, Potassium, Calcium, Phosphorus, Iron, Zinc, Iodine and Fluoride.

Metabolism – Glycolysis, TCA cycle, Beta oxidation of saturated fatty acid, Ketone bodies – formation and significance. Deamination, Transamination. Amino acid pool, Urea cycle.

• Digestive System:

Alimentary canal and digestive glands – Structure in relation to functions. Composition, functions and regulation of secretion of digestive juices including bile. Digestion and absorption of carbohydrate, protein and lipid. Movements of the stomach and small intestine.

DSC1AP: Fresh tissue experiments & Identification of permanent slides (Practical)
Credits 02

Contents:

1. Fresh tissue experiments:

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

2. Identification of permanent slides:

- Lung, spleen, liver, salivary glands, pancreas, oesophagus, stomach, small intestine, large intestine, ovary, adrenal, testis, thyroid, spinal cord, cerebellum, cerebral cortex, kidney, skin, tongue

Suggested Readings:

1. Text book of Medical Physiology, by A.C. Guyton, John E. Hall, Eleventh edition. Elsevier Saunders.
2. Vander et al's Human Physiology: The Mechanisms of Body Function; 9th Edition Eric P. Widmaier, Hershel Raff, Kevin T. Strang The Mc Graw-Hill Companies.
3. Human Physiology, From Cells to Systems Lauralee Sherwood, Brooks/Cole.
4. Best & Taylor's Physiological Basis of Medical Practice, edited by B.R Brobeck. The William and Wilkins Co.
5. Ganong's Review of Medical Physiology, by Kim E. Barrett et al., Lange Medical Book.
6. Harper's Review of Biochemistry by R K. Murry and others. Lange Medical Book, Prentice-Hall International.
7. Lehninger Principles of Biochemistry, by, D. L. Nelson and M. M. Cox, CBS Publishers Inc.
8. Text book of Biochemistry, by E.S. West, W.R. Todd, H.S. Mason, J.T. Van Bruggen, The Macmillan Company.
9. Biochemistry, by D. Das: Academic Publishers.
10. Biophysics and Biophysical Chemistry, by D .Das, Academic Publishers.
11. Samson Wright's Applied Physiology, edited by C.A. Keele. E. Neil & N. Toets. Oxford University Press.
12. Physiology, by R.M. Berne & M.N. Levy, B.M. Koeppen, B. A. Stanton, Mosby Co.
13. Basic Histology, by L.C. Jungquire, J. Carneiro& J.A Long; Appleton & Lange.
14. Neuroscience Third Edition Edited By D. Purves, G. J. Augustine, D. Fitzpatrick, W. C. Hall, A S.I. Lamantia, J.O. Mcnamara, S. M Williams, Publishers Sinauer Associates, Inc.
15. Histology - A Text and Atlas, by M.H.Ross&E.J.Reith, The Williams and Wilkins Company.
16. Bailey's Text Book of Histology, revised by W.M. Copenhaver; The Williams and Wilkins Company.
17. Human Physiology, by R.F. Schmidt & G. Thews, Springer-Verlag.

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SEMESTER-II

Course Structure

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC4 [DSC-1B]		DSC-1BT: Blood, body fluid and immune System, Cardiovascular System and Respiratory System.	Core Course-4	4	0	4	6	75
		DSC-1BP: Practical						
CC5 [DSC-2B]		DSC-2B: TBD <i>(from other Discipline)</i>	Core Course-5				6	75
CC6 [DSC-3B]		DSC-3B: TBD <i>(from other Discipline)</i>	Core Course-6				6	75
AECC (Elective)		ENVS	AECC-2 (Elective)				4	100
Semester Total							22	375

L=Lecture, **T**=Tutorial, **P**=Practical, **CC** = Core Course, **TBD** = To be decided, **AECC (Elective)** = Ability Enhancement Compulsory Course (Elective); **ENVS** - Environmental Studies

DSC-1 = Discipline Specific Core of Subject-1, **DSC -2** = Discipline Specific Core of Subject-2, **DSC -3** = Discipline Specific Core of Subject-3

SEMESTER- II

DSC-1B (CC-4): Blood, body fluid and immune System, Cardiovascular System and Respiratory System **Credits 06**

DSC1BT: Blood, body fluid and immune System, Cardiovascular System and Respiratory System **Credits 04**

Course Contents:

Blood and Body fluids:

Blood : Properties of blood, Composition, character, properties and function of blood. Plasma proteins: origin, separation and functions. Plasmapheresis. Erythrocytes : Morphology, fate and functions. Erythropoiesis: Definition, steps of erythropoiesis, role of different factors on erythropoiesis. Haemoglobin: functions, derivatives. Abnormal haemoglobin. Anaemia: different types, Clinical significances. Leucopoiesis. Leucocytes : morphology, and functions. Phagocytosis, Inflammation. Leukaemia. Platelets: Structure, functions. Significance of platelets counts. Coagulation of blood: Mechanism of blood coagulation, factors affecting blood coagulations, Anticoagulants. Bleeding disorders, tests for bleeding disorders. Coagulation time, bleeding time, prothrombin time.

Blood groups - The ABO systems, The Rh systems, Importance of blood groups, Immunological basis of identification of ABO and Rh blood groups. Cross matching, Donor and Recipient. Blood transfusion- Precaution and hazards of blood transfusions. The RH system and pregnancy, Erythroblastosis foetalis. Blood volume: Normal value. Determination of blood volume. factors influencing blood volume, regulation of blood volume.

Body fluids: Intracellular and extra cellular compartment of body fluids. Lymph and tissue fluids: Composition, function and fate of lymph and tissue fluids.

Immune System

Immune system: Overview, properties of immune system, types of immunity : innate immunity, acquired immunity, active and passive immunity. First and second line defence. Humoral and Cell mediated immunity. Complement system. Immune Competent cells : structure and functions of neutrophil, B lymphocytes, T- lymphocytes (helper, cytotoxic and suppressor), Natural killer cells, monocytes – macrophages. Primary and Secondary lymphoid organs.

Antigen and Antibody : Properties of immunogen, antigens and haptens. Classification, structure and functions of immunoglobulins. Antigen- antibody reaction, physiological effects and clinical significances. Vaccination: Immunization- Passive and active immunization. Vaccine.

Cardiovascular system:

Cardiovascular system - Anatomy and histology of the heart. Properties of cardiac muscle. Origin and propagation of cardiac impulse. Electrophysiology of cardiac tissue. Heart rate and its regulations. Frank – Starlings law's of heart. Electrocardiography

Cardiac cycle: Events. Different phases and factors affecting. Heart sounds. Cardiac output: definition, factors affecting.

Pulse - arterial and venous. Blood pressure and its regulation and factors controlling. Baro and Chemoreceptor.

Respiratory System:

Anatomy and histology of the respiratory passage and organs. Role of respiratory muscles in breathing. Lung Compliance & surfactant, Significance of physiological and anatomical dead space. Lung volumes and capacities. Exchange of respiratory gases between lung and blood and between blood and tissues. Transport of oxygen and carbon dioxide in blood. Hypoxia, asphyxia, dyspnea, asthma, cyanosis, dysbarism.

DSC1BP: Practical

Credits 02

Contents:

Haematology:

1. Preparation of blood film of your own blood. Staining of the blood film with Leishman's stain. Identification of different types of blood corpuscles.
2. Determination of TC of RBC and WBC by haemocytometer.
3. Differential count of WBC.
4. Determination of ESR of human blood.
5. Estimation of haemoglobin by haemoglobinometer.
6. Preparation of haemin crystals.
7. Determination of Blood groups.
8. Determination of clotting time, bleeding time, prothrombin time.

Human Experiment:

1. Measurement of arterial blood pressure by Sphygmomanometer at rest and after exercise, Calculate the mean arterial blood pressure (MABP)
2. Measurement of heart rate and pulse rate (30 beats methods) during rest and exercise and graphical plotting.
3. Modified Harvard step test and determination of physical fitness.
4. Demonstration: Measurement of oxygen saturation by pulse oxymeter before and after exercise. Measurement of Peak Expiratory Flow Rate.

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