

VANITA VISHRAM WOMEN'S UNIVERSITY

SCHOOL OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BIOTECHNOLOGY



**VANITA VISHRAM
WOMEN'S UNIVERSITY**

SURAT

BACHELOR OF SCIENCE (B.Sc.) IN BIOTECHNOLOGY

For Undergraduate (UG) Education

SEMESTER - 2

Core Courses (CC)

**Syllabus applicable to the students seeking admission in the
following Program**

B.Sc. Biotechnology w.e.f. the Academic Year 2022-23

BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY

SEMESTER 2

CORE COURSE PAPER 4

BIOCHEMISTRY – I

Course Objectives:

Demonstrate knowledge and understanding of the molecular machinery of biomolecules that make living cells
Demonstrate knowledge and understanding of the principles that govern the structures of biomolecules
To develop the ability to think critically about Structural and functional moieties of different biomolecules
To give Students a brief study on metabolism of biomolecules.

Course Outcome:

Students will be able to understand regarding water and its way to make up biological life.
Students will have an understanding regarding biomolecules and their metabolism.
Students will have an enhanced knowledge on different structural and functional moieties of molecules such as carbohydrate and nucleic acid.
Students will have an in-depth knowledge on DNA and Nucleotide metabolism will help.

BT11320 - THEORY COURSE CONTENT

(2 Credits)

UNIT1	Carbohydrate: Structure & Functions: Introduction, Definition & Classification, Biological function, Isomers, Epimers, Enantiomers, Mutarotation Monosaccharides: Structures and conformational itineraries properties of Monosaccharides, Structural aspects of glucose (Open chain and closed chain), Chemical reactions of Glucose Disaccharides: Reducing and non reducing sugars, Structure of sucrose and lactose Polysaccharides: Homopolysaccharides & Heteropolysaccharides, Few examples of homo and hetero polysaccharides; Mucopolysaccharides, Bacterial cell wall polysaccharides, Over view of glycoproteins & their biological functions	07 lectures
UNIT2	Amino acids & Proteins: Structure & Function: Structure, chemical & physical properties of amino acids, Classification of Amino acids, Non-standard amino acids, Zwitter ion and isoelectric point, Amino acids as drugs, Types of proteins and their classification, Forces stabilizing protein structure and shape, Different Level of structural organization of proteins	08 lectures
UNIT3	Lipids: Structure & Function: Introduction, Classification, Nomenclature, Properties & Functions & properties of Lipids: Fatty acids, triacylglycerols, phospholipids, Glycolipids,	08 lectures

	lipoproteins, cerebrosides, gangliosides, Prostaglandins, Cholesterol, steroids and amphotiphic lipids	
UNIT4	Nucleic acid: Structure & Function: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, Purines & Pyrimidines, Biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z Vitamins: Introduction, Nomenclature and classification of vitamins, Occurrence and biological functions of – Fat soluble and water-soluble vitamins.	07 lectures

SUGGESTED READING

1. U Satyanarayanan 6th Edition, Biochemistry Elsevier Health Sciences. 2019
2. David L. Nelson, Michael Cox, Aaron Hoskins, Lehninger's Principles of Biochemistry MacMillan Learning. 2021
3. Berg, J. M., Tymoczko, J. L. and Stryer, L. Biochemistry. VI Edition. W.H Freeman and Co. 2006.
4. Buchanan, B., Gruissem, W. and Jones, R. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.2000
5. Voet & Voet, Biochemistry Jhon Willey and sons.2021
6. Lubert Stryer , 9th Edition, Biochemistry , W H freeman
7. S. K. Sawhney, Randhir Singh, Introductory Practical Biochemistry, Alpha Science International. 2005.
8. David T. Plummer, 3rd Edition. An introduction to Practical biochemistry, McGraw Hill Education Pvt Ltd. 2017.

BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY

SEMESTER 2

CORE COURSE PAPER 5

ANIMAL AND PLANT PHYSIOLOGY

Course Objectives:

- To provide a course of study in animal, primarily human, and plant systems physiology and basic physiological principles.
- To provide students with a basic understanding of the fundamental processes and mechanisms that serve and control the various functions of the living body
- To expand on some area, include circulatory system, the cardiovascular system, neurophysiology of animal and tissues, transport, nutrients uptake and growth, photosynthesis, respiration in plants.
- To develop the ability to think critically about issues in animal physiology and write about those in an effective manner

Course Outcome:

- Students will have an enhanced knowledge and understanding of eukaryotic physiology.
- Students will be able to understand the functions of important physiological systems including the cardiorespiratory, renal, reproductive and metabolic systems;
- Students will be able to understand how these separate systems interact to yield integrated physiological
- They will have enhanced knowledge on responses to run a body smoothly.
- They will understand the process of photosynthesis and other physiological action in plants
- Students will understand the role of micro and macro element and role of plant growth hormones.

BT11330 - THEORY COURSE CONTENT

(4 Credits)

UNIT1	Respiration & Circulation Respiration: Exchange of gases, Transport of O ₂ and CO ₂ , Composition of blood, Plasma proteins & their role, Hemopoiesis, Mechanism of coagulation of blood, Mechanism of working of heart: Cardiac output, cardiac cycle, origin & conduction of heart beat	07 lectures
UNIT2	Muscle physiology and Endocrine coordination: Structure of cardiac, smooth & skeletal muscle, mechanism of muscle contraction, Excretion: modes of excretion, Ornithine cycle, Different endocrine glands: hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenal their role in human physiology	08 lectures

UNIT3	Osmosis, Transpiration & Respiration in plant: Turgor pressure, Osmosis, imbibition, guttation, transpiration, stomata & their mechanism of opening & closing, Respiration: its types and significance, Ascent of sap: transpiration pull and cohesion theory by Dixon and Jolly and its significance, Seed dormancy: causes and resolution, concept of photoperiodism and vernalization and their significance	08 lectures
UNIT4	Photosynthesis & Plant Hormones: Photosynthesis: photosynthetic pigments, concept of two photo systems, C 3 and C4 plants, Growth and development: Definitions, phases of growth, growth curve, growth hormones: auxins, gibberellins, cytokinin, abscisic acid and ethylene Physiological role and mode of action, micro and macro elements and their role in plant growth and development	07 lectures

SUGGESTED READING

1. Karp, G. & Harris, D. (2008) Cell and Molecular Biology – Concepts and Experiments, John Wiley & Sons Inc, New York.
2. Alberts, B., Bray, D., Hopkin K., Johnson A., Lewis, L., Raff, M., Roberts, K., & Walters, P. (2014) Essential Cell Biology. 4th Edition, Garland Science, Taylor and francis Group, LLC.
3. Robertis, E.D.P. & Robertis, E.M.F. (1998). Cell Biology and Molecular Biology, 8th edition, Sauder College.
4. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.
5. Verma P.S. and Agarwal V. K. (1998). Cell Biology, Genetics, Molecular Biology, Evolution and ecology.
6. Wasserman, S. A., Minorsky, P. V., Reece, J. B., & Campbell, N. A. (2017). Campbell biology. Eleventh edition. New York, NY: Pearson Education, Inc.
7. The World of the Cell by Wayne M. Becker

BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY

SEMESTER 1

CORE COURSE PAPER 3

BIOTECHNOLOGY PRACTICAL I

Course Objectives:

- Students will learn biochemical analysis of various biomolecules.
- Students will learn various plant and animal physiological concepts.

Course Outcome:

- Student would be able to analyze biomolecules qualitatively and quantitatively.
- Students would be having exact know how of physiological concepts.

BT11340 - PRACTICAL COURSE CONTENT

(2 Credits)

1	Qualitative tests for Carbohydrates
2	Quantitative estimation of free amino acids in biological samples by Ninhydrin method.
3	Qualitative tests for proteins.
4	Qualitative tests for Lipids: Determination of acid value, iodine value and saponification values of fats & oils.
5	Biochemical and spectrophotometric estimations of DNA.
6	Biochemical and spectrophotometric estimations of RNA.
7	Estimation of vitamin A or vitamin E by colorimetric assay
8	Demonstration of transpiration/evaporation (Ex-Bell Jar method or any suitable method).
9	Separation of photosynthetic pigments by paper chromatography.
10	Demonstration of aerobic respiration
11	Determine the rate of photosynthesis in aquatic plant
12	Demonstration of ascent of sap by ringing method/eosin dye method.

SUGGESTED READING

1. Rakesh Patel. Experimental Microbiology. Volume
2. Sawhney & Singh. *Introductory Practical Biochemistry*. Updated edition
3. *Botany Practical* Volume 2 by Bendre & Kumar
4. *Fundamentals of Plant Physiology* by Dr. V. K. Jain, 19th Edition, S. Chand Publication