

# **VANITA VISHRAM WOMEN'S UNIVERSITY**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF BIOTECHNOLOGY**



**Under Learning Outcomes Based Curriculum Framework  
(LOCF)**

**For Undergraduate (UG) Education**

**SEMESTER - 2**

**Ability Enhancement Compulsory Courses (AECC)**

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

**B.Sc./B.A./B.Com./B.B.A./ B.C.A. under LOCF w.e.f. the  
Academic Year 2021-2022**

# BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY HONOURS

## SEMESTER 2

### ABILITY ENHANCEMENT COMPULSORY COURSE PAPER 2

#### ENVIRONMENTAL STUDIES-II

##### Course Objectives:

- Creating the awareness about major environmental problems among people.
- Various types of pollution and their management with legal aspect of various environmental issues.
- Motivating public to participate in environment protection and environment improvement.
- Protection of environment by various laws and help of common people.

##### Course Outcome:

The expected Student Learning Outcomes would be:

- Environmental pollution and its control and management
- Various environmental laws, treaties and ethics.
- Understand core concepts and methods from ecological and other sciences and their application in environmental problem-solving.
- Apply concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

**BT12010 - THEORY COURSE CONTENT****(2 Credits)**

<b>UNIT1</b>	<b>Environmental pollution</b> Definition Causes, effects and control measures of :-Air pollution, Water pollution, Soil pollution, Marine, Noise pollution, Thermal pollution, Nuclear hazards Role of an individual in prevention of pollution. Disaster and management	<b>15 lectures</b>
<b>UNIT2</b>	<b>Environmental, Policies, laws and practices</b> Concept of sustainability and sustainable development. Environmental treaties: Montreal protocol, Kyoto Protocol, Environment Laws. a) Air (Prevention and Control of Pollution) Act. b) Water (Prevention and control of Pollution) Act c) Wildlife Protection Act d) Forest Conservation Act e) Environment: rights and duties National green tribunal Biodiversity Laws	<b>15 lectures</b>
<b>UNIT3</b>	<b>Human Population and Environment</b> Population growth, human health and welfare; infectious and lifestyle diseases in contemporary world. Common Diseases: Air borne diseases (Tuberculosis, influenza), food-borne diseases (Cholera, Hepatitis) Vector borne diseases (malaria, Dengue), Viral diseases (Covid- 19) Drug addiction: causes, symptoms, prevention and rehabilitation Environmental movements: Chipko Movement, Narmada Bachao Andolan, Silent Valley Movement, Swacch Bharat Mission	<b>15 lectures</b>
<b><u>Field/Practical Work (In Assignment form)</u></b>		

Students are required to carry out the following practical work

1. To identify the sources of air pollution in your area/any visited area
2. To identify the sources of water pollution in your area/any visited area
3. To identify the sources of noise pollution in your area/any visited area

## **SUGGESTED READING**

### **Text books**

- Ambasht R. S. and N.K. Ambasht., January 2017. A Textbook of Plant Ecology: 15th edition. CBS Publication
- P.D. Sharma., January 2017. Ecology and Environment 13th edition. Rastogi Publications.
- H. P. Kumar., January 2018. Modern Concepts of Ecology: 8th edition, Vikas Publishing House Pvt. Ltd.

### **Reference books**

- R. K. Khitoliya., 2012. Environmental Pollution 2nd edition. S. Chand Publishing 9788121923859
- Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2006. Environmental and Pollution Science. Elsevier Academic Press.
- □ Purohit, S.S. & Ranjan, R. 2007. Ecology, Environment & Pollution. Agrobios Publications.

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**VANITA VISHRAM  
WOMEN'S UNIVERSITY**

**SURAT**

**BACHELOR OF SCIENCE (B.Sc.) HONOURS IN  
BIOTECHNOLOGY**

**Under Learning Outcomes Based Curriculum Framework  
(LOCF)**

**For Undergraduate (UG) Education**

**SEMESTER - 2**

**Core Courses (CC)**

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

**B.Sc. Biotechnology under LOCF w.e.f. the Academic Year**

**2021-2022**

# BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY HONOURS

## SEMESTER 2

### CORE COURSE PAPER 3

#### CELL BIOLOGY

##### Course Objectives:

- To give information and knowledge about basic components of prokaryotic and eukaryotic cells.
- To make students aware about cellular structures and their organelles.
- To explain the students about various functions of cell and their role in metabolism.
- To make students understand about cell communication and signaling with other cells and environment.
- To demonstrate significant cell biological principles, cell cycle, role of cell and it's working that enable the students to translate the theoretical foundation into practical understanding.

##### Course Outcome:

Students will be able to understand the difference between prokaryotic and eukaryotic cells.

Students will be able to draw the model of a cell. Besides this, students can,

- Summarize the structure and functions of various cell organelles.
- Able to understand cell cycle and cell signaling pathways.
- Utilize this knowledge in the field of biotechnology to develop genetically modified organisms.
- Apply the knowledge of cell control and regulation of cell cycle to meet the need of practical field, i.e., in treatment of any disease, in development of drug, to produce primary or secondary metabolites etc.
- Distinguish the functionally abnormal cells and their mechanism.

**BT11050 - THEORY COURSE CONTENT****(4 Credits)**

<b>UNIT 1</b>	<b>Cell and Cell membrane</b> Cell: Introduction and classification of organisms by cell structure Cytosol Compartmentalization of eukaryotic cells Cell fractionation Cell Membrane and Permeability: Chemical components of biological membranes, Organization and Fluid Mosaic Model, Membrane as a dynamic entity, Cell recognition and membrane transport	<b>10 lectures</b>
<b>UNIT 2</b>	<b>Cell structures and functions I</b> Membrane Vacuolar system Cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments Endoplasmic reticulum: Structure, Function including role in protein segregation Golgi complex: Structure, Biogenesis, Functions including role in protein secretion Endospores and sporulation in bacteria	<b>15 lectures</b>
<b>UNIT 3</b>	<b>Cell structures and functions II</b> Lysosomes: Vacuoles and micro bodies: Structure and functions Ribosomes: Structures, Function including role in protein synthesis Mitochondria: Structure, Function, Genomes, Biogenesis Chloroplasts: Structure, Function, Genomes, Biogenesis Nucleus: Structure, Function, Chromosomes and their structure	<b>20 lectures</b>

<b>UNIT 4</b>	<p><b>Cell Regulation, Cell Cycle and Cancer</b></p> <p>Extracellular Matrix: Composition, Molecules that mediate cell adhesion, Membrane receptors for extra cellular matrix, Macromolecules, Regulation of receptor expression and function, Signal transduction</p> <p>Quorum sensing</p> <p>Cell cycle: Mitosis and Meiosis: Control points in cell-cycle progression in yeast, Role of meiosis in life cycles of organism</p> <p>Cancer: Carcinogenesis, Agents promoting carcinogenesis, Characteristics and molecular basis of cancer</p>	<b>15 lectures</b>
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### **BT11060 - LAB COURSE CONTENT**

**(2 Credits)**

1	Study the effect of temperature and organic solvents on semi permeable membrane.
2	Demonstration of dialysis.
3	Study of plasmolysis and de-plasmolysis.
4	Cell fractionation and determination of enzyme activity in organelles using sprouted seed or any other suitable source.
5	Study of structure of any Prokaryotic and Eukaryotic cell.
6	Microtomy: Fixation, block making, section cutting, double staining of animal tissues like liver, esophagus, stomach, pancreas, intestine, kidney, ovary, testes.
7	Cell division in onion root tip/ insect gonads.
8	Preparation of Nuclear, Mitochondrial & cytoplasmic fractions

### **SUGGESTED READING**

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.



4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Urry L.A.; Cain M. L.; Wasserman S. A. 2011. Campbell Biology. 11th Edition. Pearson, New York.

# BACHELOR OF SCIENCE (B.SC.) BIOTECHNOLOGY HONOURS

## SEMESTER 2

### CORE COURSE PAPER 4

#### EUKARYOTIC PHYSIOLOGY

##### Course Objectives:

- To provide a course of study in mammalian, 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 cardio-respiratory, renal, reproductive and metabolic systems;
- Understand how these separate systems interact to yield integrated physiological responses to run a body smoothly.
- Analyse and report on abnormal behaviour and observations in physiology;
- Recognise and identify principal tissue structures, functions and their role.

**BT11070 - THEORY COURSE CONTENT****(4 Credits)**

<b>UNIT 1</b>	<b>Respiration and Circulation</b> Respiration: Exchange of gases, Transport of O <sub>2</sub> and CO <sub>2</sub> , Oxygen dissociation curve, Chloride shift Composition of blood, Plasma proteins & their role, blood cells, Haemopoiesis, Mechanism of coagulation of blood. Mechanism of working of heart: Cardiac output, cardiac cycle, Origin & conduction of heart beat.	<b>15 lectures</b>
<b>UNIT 2</b>	<b>Muscle physiology, Osmoregulation and Endocrine coordination</b> Structure of cardiac, smooth & skeletal muscle, threshold stimulus, All or None rule, single muscle twitch, muscle tone, isotonic and isometric contraction, Physical, chemical & electrical events of mechanism of muscle contraction. Excretion: modes of excretion, Ornithine cycle, Mechanism of urine formation. Mechanism of action of Hormones (Insulin and steroids) Different endocrine glands: Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenal Hypo & Hyper secretions	<b>15 lectures</b>
<b>UNIT 3</b>	<b>Plant Anatomy and Nutrition (15 Lectures)</b> The shoot and root apical meristem and its histological organization, simple & complex permanent tissues, primary structure of shoot & root, secondary growth in stem and roots, leaf anatomy. Plant water relations and micro & macro nutrients Plant water relations: Importance of water to plant life, diffusion, osmosis, plasmolysis, imbibition, guttation, transpiration, stomata & their mechanism of opening & closing Micro & macro nutrients: and their role in plant development, Ascent of sap	<b>15 lectures</b>

<b>UNIT 4</b>	<p><b>Photosynthesis and Growth (15 Lectures)</b></p> <p>Photosynthesis- Photosynthesis pigments, concept of two photo systems, photphosphorylation</p> <p>Growth and development</p> <p>Growth and development: Definitions, phases of growth, growth curve, growth hormones (auxins, gibberlins, cytokinins, abscisic acid, ethylene)</p> <p>Physiological role and mode of action, seed dormancy and seed germination, concept of photo- periodism and vernalization</p>	<b>15 lectures</b>
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**BT11080 - LAB COURSE CONTENT**  
(2 Credits)

1. Finding the coagulation time of blood
2. Determination of blood groups
3. Counting of mammalian RBCs
4. Determination of TLC and DLC
5. Demonstration of action of an enzyme
6. Determination of Haemoglobin
7. Preparation of stained mounts section of monocot and dicot's root, stem & leaf.
8. Demonstration of plasmolysis by *Tradescantia* leaf peel Ascent of Sap
9. Demonstration of transpiration/ evaporation by Bell Jar method.
10. Separation of photosynthetic pigments by paper chromatography.
11. Demonstration of aerobic respiration.
12. Determine the rate of photosynthesis in aquatic plant

**SUGGESTED READING**

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.
2. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition. John wiley & sons, Inc.
3. Dickinson, W.C. 2000 Integrative Plant Anatomy. Harcourt Academic Press, USA.

4. Esau, K. 1977 Anatomy of Seed Plants. Wiley Publishers.
5. Fahn, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.
6. Hopkins, W.G. and Huner, P.A. 2008 Introduction to Plant Physiology. John Wiley and Sons.
7. Mauseth, J.D. 1988 Plant Anatomy. The Benjamin/Cummings Publisher, USA.
8. Nelson, D.L., Cox, M.M. 2004 Lehninger Principles of Biochemistry, 4 edition, W.H. Freeman and Company, New York, USA.
9. Salisbury, F.B. and Ross, C.W. 1991 Plant Physiology, Wadsworth Publishing Co. Ltd.
10. Taiz, L. and Zeiger, E. 2006 Plant Physiology, 4 edition, Sinauer Associates Inc .MA, USA