SEMESTER: I PART: III	22UBTHA01: BIODIVERSITY – ALLIED I	CREDIT: 04 HOURS: 04

COURSE OBJECTIVES

1) To introduce the students to the essential basics of plants, and animals.
2) To explain about the plant and animal diversity
3) The student comes to know about the Biodiversity values and threats.
4) To knowledge the biodiversity hotspots and their conservation.
5) To distinguish plant distribution, vegetation pattern of world, continental, state level, forest biodiversity management.

Unit I: Introduction to Biodiversity **Hours: 09**

Introduction to Biodiversity, components of biodiversity. Biodiversity Hotspots - Criteria for selection of hotspots, Indian hotspots. Keystone species and their significance - scope and application of biodiversity.

Unit II: Plant Diversity **Hours: 10**

Kingdom - Plantae, Structure and reproduction (No developmental studies) Algae (Ectocarpus), Fungi (Puccinia), Bryophytes (Funaria), Pteridophytes (Selaginella), Gymnosperms (Cycas). Economic importance of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.

Unit III: Animal Diversity **Hours: 10**

Kingdom – Animalia Structure, organization and life history of Entamoeba histolytica, Taeniasolium, Ascaris, Penaeus indicus, Pila globosa, Star fish and Calotes.

Unit IV: Biodiversity values and threats **Hours: 10**

Direct use value (Food, Medicine, Biological control, Industrial materials, Recreational harvesting, Ecotourism). Threats to biodiversity – Direct exploitation - Habitat loss, fragmentation and degradation. Introduced species- Extinction cascade - Red data Book.

Unit V: Biodiversity Conservation **Hours: 09**

In situ conservation - objectives – National Parks- Wild life reserves and Sanctuaries - Biosphere reserves. Ex situ conservation principle - Botanical garden. Germplasm collection - Seed banks Cryopreservation.

COURSE OUTCOMES

1) The students will gain knowledge on the diversity of plant, animal and their importance.
2) The students can comprehend the structure and function of various ecosystems and hotspots.
3) The students can understand and differentiate the various plant ecological adaptations.
4) The students will be able biodiversity values and threats and its conservation strategies.

5) The students will gain knowledge on the importance of bioresources in human welfare

Text Books (In API Style)

1) Maiti, P.K., & Maiti, P. (2011). *Biodiversity: Perception, peril and preservation* (1st ed.). New Delhi: PHI Learning.
2) Longman, K.A., & Jenik, J. (1987). *Tropical forest and its Environment*: (2nd ed.). London: ELBS.
3) Ekambaranatha Ayyar, M., & Ananthakrishnan, T.N. (2008). *A manual of Zoology*. Vol. I& II (Part 1 & 2). Chennai: Ananda Book Depot.

Supplementary Readings

1) Odum, E.P. (1983). *Basic Ecology*. New York: CBS College Publishing.
2) Barnes, R. D. (2001).*Invertebrate Zoology*. (5th ed.). Philadelphia: Saunders College Publishing.

OUTCOME MAPPING

COs	PO1	PO2	PO3	PO4	PO5
CO1	1	2	2	2	1
CO2	2	3	3	3	2
CO3	2	3	3	3	2
CO4	3	3	3	3	3
CO5	3	3	2	3	3

1: Low; **2:** Moderate; **3:** High

SEMESTER: I PART: III	22UBTHAP1: LAB IN BIODIVERSITY ALLIED PRACTICAL - I	CREDIT: - HOURS: 03

LIST OF EXPERIMENTS

1) Study of the field collection, preservation and identification of plants
2) Study of the field collection, preservation and identification of animals
3) Diversity indices of given species (Shannon–Weaver Information Index or Simpson Dominance Index)
4) Identify biodiversity of pond ecosystem (using charts only)
5) Identify biodiversity of grassland ecosystem (using charts only)
6) Identify biodiversity of marine ecosystem (using charts only)
7) List out Plant diversity in the campus
8) List out Animal diversity in the campus
9) Preparation of Herbarium

SEMESTER: I PART: III	22UBTHA02: BIOPHYSICS – ALLIED II	CREDIT: 04 HOURS: 04

COURSE OBJECTIVES

1) To study the application of physics to biological systems
2) To learn the concepts and techniques of biophysics
3) To find the applications of biophysics in molecular studies and medicine

Unit I Introduction to Biophysics **Hours: 09**

Introduction - Molecular Biophysics; Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Bioenergetics: Basic concept of energy coupling reactions in biological processors, Energy requirements in cell metabolism, high energy bonds, energy currency of cell.

Unit II Membrane Biophysics **Hours: 10**

Physical Properties of membrane: Elastic properties, Elastic constants, Chargeinduced microstructures and domain. Membrane melting. Membrane potentials: Cell surface charge, Resting membrane potential, Action potential, Membrane impedance and capacitance, Transmembrane potential, total electrochemical potential.

Unit III Biophysical Techniques and Methods **Hours: 10**

Introduction to Light: Reflection, Refraction, Diffraction, Interference phenomena, Refractometry: Refraction of light and Snell's law, refractive index, principle, design, working and application of Abbe's refractometer. Polarimetry, Viscomentry, Static Scattering Techniques, Dynamic Scattering Techniques, X-Ray Diffraction and Molecular Structure, Optical Tweezers, Patch Clamping, Molecular Dynamics, Potential Energy Contour Tracing.

Unit IV Neurobiophysics **Hours: 10**

Introduction: The Nervous System; Synapse, Physics of Membrane Potentials, Membrane potential due to diffusion, Voltage Clamp, Sensory Mechanisms –The Eye; The visual receptor, Electrical activity and visual generator potentials, Neural aspects of vision, Visual communications, Physical Aspects of Hearing - The Ear; Elementary acoustics, Theories of hearing.

Unit V Radiation & Medical Biophysics **Hours: 09**

Basics of Radiation Physics: Isotopes, Isobars, Isotones, Isomers, Radioactivity, General properties of alpha, beta and gamma radiations, Radiation units. Radiolysis of water, Production of free radicals & their interactions, Radiation chemical yield and G value, Target theory, Single hit & Multi hit theory, Effect of radiation on Nucleic acids, Proteins, Enzymes. Radioisotopes in biology, Medicine (Therapy & diagnosis), Agriculture, Biological applications of radioisotope, Radiolabeling & Tracer techniques, Radiation sterilization of medical product.

COURSE OUTCOMES

1) Learn basic of Molecular Biophysics
2) Understand the Membrane Biophysics, Physical Properties of membrane and Membrane potentials
3) Know the biophysical techniques applied in understating Biomolecules
4) Learn about Neurobiophysics; Nervous System, Visionary System and Hearing System
5) Know the Role of Radiation Physics in applied medical diagnosis & treatment

Text Books

1) VasanthaPattabhi , Gautham N, 2002, "Biophysics", 1st Edition, Kluwer Academic Publishers , United States
2) Rodney MJ, Cotterill, 2002, "Biophysics: An Introduction", 2nd edition, John Wiley & Sons Ltd, United States

Supplementary Readings

1) Tom AWaigh, 2007, "Applied Biophysics- A Molecular Approach for Physical Scientists" , 1st edition, John Wiley & Sons Ltd, United States
2) Jay L Nadeau, 2018, "Introduction to Experimental Biophysics Biological Methods for Physical Scientists", 2nd Edition, CRC Press, United States.
3) Glaser, Roland, 1999, "Biophysics", 1st edition, Springer-Verlag Berlin, Heidelberg.
4) Parke, William C, 2020, "Biophysics: A Student's Guide to the Physics of the Life Sciences and Medicine", 1st edition, Springer International Publishing, United States

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