POOL OF DISCIPLINE SPECIFIC ELECTIVES (DSE) COURSES

DISCIPLINE SPECIFIC ELECTIVES (DSE-1): Aquatic Biology
Zoo-DSE-1

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
Aquatic Biology Zoo-DSE-1	04	03	00	01	Passed 12th Class	NIL	Zoology

Learning Objectives

The learning objectives of this course are as follows:

- This course offers a comprehensive knowledge on life in freshwater and marine environments; lakes; stream and their characteristics, adaptations of organisms, water resource management; nutrient cycling; major threats to aquatic systems, pollution and eutrophication.
- To impart knowledge and understanding of basic laboratory equipment and practice of water quality analysis, to study of aquatic plants.
- To introduce various freshwater and marine ecosystems and its components.
- To understand the biodiversity and productivity of freshwater and marine environments.
- To impart knowledge on various threats and conservation strategies.

Learning Outcomes

By studying this course, students will be able to

- Be acquainted with the physico-chemical environment, and its role in aquatic ecosystem.
- Learn about adaptations unveiled by organisms to survive in these distinctive conditions.
- well-versed with the laws governing the use of freshwater systems, as well as the local, state, federal, and international agencies that enforce these laws to protect endangered and vulnerable species.
- Understand and apply relevant scientific principles in the area of aquatic biology and educate others or work to conserve our natural resources.
- Realize impact of human activities on aquatic organisms.

SYLLABUS OF DSE-1

UNIT-I: Aquatic Biomes **6 hrs**

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), Estuaries, Intertidal zones, Oceanic pelagic zone, Marine benthic zone and Coral reefs.

UNIT-2: Lakes **9 hrs**

Lakes: Origin and classification (Glacial, Tectonic, Volcanic and Fluvial Lakes), Lake as an Ecosystem, Lake morphometry, Physico–Chemical Characteristics: Thermal stratification, Vertical distribution of oxygen in lakes, Dissolved Nitrates and Phosphates, Turbidity.

UNIT- 3: Streams and Rivers **9 hrs**

Streams: Different stages of stream development, Physico-chemical environment, Stream flora and fauna. Adaptations of hill stream fishes. Rivers: Origin and characteristics of river. Functions. Concept of watershed management. Ramsar Convention.

UNIT-4: Marine Biology **12 hrs**

Continental shelf, Salinity and density of sea water, Light attenuation in water: Photic, dysphotic and aphotic zones. Adaptations of deep-sea organisms. Marine mammals and their adaptations. Coral reefs: Formation, distribution, fauna and effect of climate change. Physico-chemical characteristics of estuaries, estuarine ecosystem.

UNIT-5: Management of Aquatic Resources **9 hrs**

Major threats to freshwater systems, including pollution and sand mining. Impact of large dams and fragmentation on river ecology and fishery. Thermal pollution and oil spills; Sewage treatment, Water quality assessment- BOD and COD.

Practical **30 hrs**

(Laboratory periods: 15 classes of 2 hours each)

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identification of following present in a lake ecosystem (3-5 each):
   a) Macrophytes
   b) Phytoplankton
   c) Zooplankton

3. Estimation of pH, dissolved oxygen, alkalinity, free carbondioxide, carbonates and bicarbonates in water collected from a nearby lake/ water body.

4. Estimation of Biochemical oxygen demand of water sample.
5. To demonstrate the following instruments used in limnology and discuss its significance:
   a) Secchi disc
   b) Van Dorn Bottle
   c) Conductivity meter
   d) Turbidity meter
   e) PONAR grab sampler
6. Project Report on a visit to a Sewage treatment plant/Freshwater ecosystem (wetland, lake, river side etc.)/Marine bio-reserve/Fisheries Institutes.

Essential/recommended readings

1. Sullivan O.P. and Reynolds C.S. (2004) The lakes hand book, Limnology and limnetic ecology. Wiley Blockwell.
2. Brian R. Moss (2018) Ecology of Freshwaters: Earth's Blood stream (5thedition). Wiley.
3. Dodds W.K. and Whiles M.R. (2019). Freshwater Ecology: Concepts and Environmental Applications of Limnology (3rd edition). Academic Press.
4. Barrick, M., Odum, E.P., Barrett, G.W., (2005). Fundamentals of Ecology. 5thEdition. Cengage Learning.

Suggested readings:

1. Robert G. Wetzel. (2001)Limnology: Lake and River Ecosystems. 3rdedition.
2. Castro and Huber. MarineBiology.11th Edition, Mc Graw and Hill.