

Introduction:

Limnology is the study of the structural and functional interrelationships of organisms of inland waters as they are affected by their dynamic physical, chemical, and biotic environments. One of the most important goals of limnology is providing guidelines for water management and water pollution control. This course is based on the basic concepts of Limnology including its scope, properties of freshwater, variety of planktons present in these freshwaters, process of lake formation. It also familiarizes with the lakes in Pakistan and the ways of lake conservation and management.

Course Objectives:

The objectives of the course are to:

- Enhance the concept of limnological parameters and lake formation.
- Equip students with basic knowledge of limnology its origin and different types.
- Familiar students with the chemical and biological process occurring in the lakes to support aquatic life.
- Familiar students with the importance and conservation management of lakes problems and management of fish farm

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- Recall the basic knowledge of physico-chemical properties of lentic and lotic environment.
- Describe thermal stratification, management and conservation of lakes.
- Relate the inland water quality with the production of aquatic fauna.
- Illustrate the basin morphometry and eutrophication of lakes.
- Determine the values of various physico-chemical and biological parameters of lotic and lentic water bodies.

Course Contents:

1. **Introduction and scope of Limnology:** Introduction, History and scope, Structure of aquatic ecosystems, Origin of lotic and lentic waters and estuaries, Zonation, Thermal stratification, Eutrophication
2. **Properties of freshwater:** Physical properties of water (temperature, light, color, turbidity, conductivity); chemical properties of water (pH, oxygen, CO₂, salinity, dissolved solids, trace elements, nitrogen, phosphorous and sulphur cycles), Biological properties,
3. **Plankton (phytoplankton and zooplankton):** Methodology for collection, Preservation and identification, Planktonic adaptations and diurnal migration, Factors affecting planktonic productivity
4. **Lake formation:** Lake formation and basin morphometry, Processes of Lake Eutrophication, Sedimentation and acidification, Biological productivity in lakes
5. **Lakes of Pakistan**
6. **Conservation and Management of Lakes**

Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

Assessments and Examination

Sessional Work:	25 marks
Midterm Exam:	35 marks
Final term Exam:	40 marks

Recommended Books

1. Horne, A.J. and Golman, C. R. 2000. Limnology. McGraw Hill. Science.
2. Wetzen, R. G. and Likens, G.E. 2000. Limnological Analysis. 3rd Ed. Springer-Verleg. New York.
3. Agarwal, S.C. 1999. Limnology. A.P.H. Public New Delhi.
4. Horne, A.J. and Golman, C. R. 2000. Limnology. McGraw Hill. Science.
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7. Boyd, C.E. 2000. Water Quality in Ponds for Aquaculture. Auburn University, Alabama, USA.
8. Boyd, C.E. and Tucker, C.S. 2000. Water Quality and Pond Soil Analyses for Aquaculture. Auburn University, Alabama, USA.
9. Lamert. 1997.. Limnology. Oxford. University, UK. Mishra, R. 2002.Fresh Water Environment. Anmol Publication Pvt. Ltd., New Delhi.
10. Kestin,S.C. and Warris, P.D. 2001.Farmed fish quality. Fishing News Books, Blackwell Science Ltd.
11. Kumar, A .2003. Aquatic Ecosystems. A.P.H. Publishing Corporation, New Delhi.
12. Shammi, Q.J. and Bhatnagar, S. 2002. Applied Fisheries, Agro bios, India.
13. Ali, S.S. 1999. Fresh Water Fisher Biology. Naseem Book Depot, Hyderabad.
14. Garg, S. K., BHatnagar, A., Kalla, A., Johal, M.S. 2008. Experimental Ichthyology, Publisher: CBS publisher ISBN: ISBN 81 239 0771 0

UZO-528 Limnology (Lab.)

Cr. (1)

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Course Contents:

1. Water sampling and water preservation techniques for physico-chemical and biological analyses
2. Estimation of physical characteristics of water viz. temperature, density, light penetration and turbidity

3. Estimation of chemical characteristics of water viz. dissolved oxygen, carbon dioxide, pH, total alkalinity, total hardness, bicarbonates, chlorides, calcium, magnesium, salinity
4. Collection, preservation and study of fauna and flora of various water bodies
5. Survey of lotic and lentic water bodies
6. Study of temporary and permanent mounts of phytoplankton
7. Zooplankton collection, preservation and study of zooplankton mounts
8. Benthos collection and preservation
9. Field visit to different Lakes

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