

THEORY:**Introduction of the Course:**

The course is organized to provide an adequate knowledge about different algae and bryophytes groups with their representatives along with their Taxonomy, Morphology, Anatomy, Reproduction and Economic Importance. It is generally aimed to familiarize students with the morphological and systematic knowledge of different algae and bryophytes, and their economic importance.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts of different algae and bryophytes groups and their morphological/anatomical characteristics.
2. To give an insight into algae and bryophytes with an emphasis on their structure, reproduction and economic importance.

Contents:**1. Phycology**

- 1.1. Introduction.
- 1.2. Historical account, Evolution, Zonation, tides, habitats, geographical distribution of economically important algae:
- 1.3. Criteria for algae classification based on Biochemistry, pigment pattern, plastids, flagellation, movement pattern, cell wall structure, storage products, reproduction and life cycle pattern
- 1.4. Introduction, general account, classification and economic importance of the following phyla of algae
 - i. Cyanophyta
 - ii. Chlorophyta
 - iii. Charophyta
 - iv. Xanthophyta
 - v. Bacillariophyta
 - vi. Phaeophyta
 - vii. Rhodophyta

2. Bryology

- 2.1 Introduction and general account of bryophytes, classification, theories of origin and evolution.
- 2.2 Ecological role in absorption and retention of moisture
- 2.3 Distribution of bryophytes in Pakistan
- 2.4 Brief study of the classes: Hepaticopsida, Anthocerotopsida and Bryopsida.

Practicals:

1. Collection and preservation of algae from various habitats.
2. Identification of algae.
3. Preparation of temporary slides.
4. Culturing of algae.
5. Evaluation of algae as fertilizer.
6. Determination of the chemical composition of algal biomass.
7. Nitrogen fixation and hydrogen production by blue green algae.
8. Study of various available genera of bryophytes. For example; *Pellia*, *Porella*, *Anthoceros* and *Polytrichum*

Learning Outcome:

1. Students are expected to understand the unique and general features of Algae and Bryophytes and familiarize it.
2. They will be able to identify the external morphology, internal structure and reproduction of different types of algae and bryophytes.
3. This will enable them to predict the economic and ecological significance of bryophytes.
4. The obtained knowledge shall also enable the students to Examine the possible applications in phycology and Bryology

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Bold, H. C. & Wynne, M. J. (1985). *Introduction to Algae: structure and reproduction*. Prentice Hall Inc. Engle Wood Cliffs
2. Barsanti, L. & Gualtieri, P. G. (2006). *Algae, anatomy, biochemistry, biotechnology*. Taylor and Francis, New York.
3. Bellinger, E. G. & Sigeo, D. C. (2010). *Fresh water algae (Identification and use as bioindicators)*. John Wiley & Sons.
4. Chapman, V. J. & D. J. Chapman. (1983). *Sea weed and their uses*. MacMillan and Co. Ltd. London.
5. Dawson, E. Y. & Halt. (1966). *Marine Botany*. Reinhart and Winstan, New York.
6. Hussain, F. (2013). *Phycology*. A text book of Algae. Pak Book Empire Lahore.
7. Hussain, F. & Ilahi, I. (2012). *A text book of Botany*. Department of Botany, University of Peshawar.
8. Hussain, F., Ahmad, H. & Shah, S, Z. (2012). *The unicellular algae of District Peshawar, Pakistan*. Lambert Publication, Germany.
9. Lee. R. E. (1999). *Phycology*. Cambridge University Press, U.K.
10. Schofield, W. B. (1985). *Introduction to Bryology*. MacMillan Publishing Co.London.
11. Vashishta. B. R. (1991). *Botany for degree students. Bryophytes*. 8th ed. S. Chand and Co. Ltd. Delhi.
12. Vashishta, B. R., Sinha, A. K. & Kumar, A. (2010). *Algae*. S. Chand & Co.
13. Vashishta, B. R., Sinha, A. K. & Kumar, A. (2010). *Bryophytes*. S. Chand & Co. New Delhi.

Journals / Periodicals:

14. Pakistan Journal of Botany, International Journal of Phycology and Phycocochemistry,
15. Bryology, Phycology.
