

Course Code	Course Name	Credits
26BY611	ALGAL TECHNOLOGY	04

### Course Objectives

- Identify major algal groups and their significance.
- Explain algal cultivation and biomass production methods.
- Describe algal chemistry and product applications.
- Understand algal biotechnology and biofuel production.
- Analyze environmental and industrial applications of algae.

### Learning Outcomes

Upon successful completion of this course, it is intended that a student will be able to:

- Identify and classify important algal groups.
- Explain algal cultivation, biomass production, and processing.
- Relate algal chemistry to food, nutraceutical, and industrial uses.
- Describe modern biotechnological and biofuel applications of algae.
- Assess the role of algae in environmental management and sustainable industry.

### Unit 1 - Int Introduction to Algae (12 Hrs.)

General characteristics and classification of algae; important groups of freshwater and marine algae; identification of economically important algae; microscopic examination and staining methods; ecological significance of algae.

### Unit 2 – Algal Cultivation and Biomass Production (12 Hrs.)

Algal production systems, including open ponds and photobioreactors; strain selection; culture media; indoor and outdoor cultivation methods; scaling up of production; harvesting and processing of algal biomass; uses of algae as organic manure and biofertilizer.

### Unit 3 - Algal Chemistry and Products (12 Hrs.)

Chemical composition of algae, including proteins, amino acids, lipids, pigments, vitamins, and minerals; nutritional and medicinal products from algae; algae as a source of single-cell protein, food supplements, pigments, and fine chemicals; extraction and purification of valuable algal compounds.

### Unit 4 – Algal Biotechnology and Biofuels (12 Hrs.)

Biotechnological applications of algae; algal immobilization; strain improvement techniques; recombinant DNA approaches in algae; biofuel production from algae, especially biodiesel, bioethanol, biogas, and hydrogen; properties, advantages, and applications of algal biofuels.

### Unit 5 - Environmental and Industrial Applications (12 Hrs.)

Algae in waste treatment and phycoremediation; industrial culture of algae; applications in pharmaceuticals, nutraceuticals, and cosmetics; algal research and culture collection centers; economic importance of algae in sustainable industries and green technologies.

### Reference Books:

1. Anderson, R. A. (2005). *Algal Culturing Techniques*. Elsevier Academic Press.
2. Khattar, J., Singh, D. P., & Kaur, G. (2009). *Algal Biology and Biotechnology*. I K International Publishing House.
3. Dominguez, H. (2013). *Functional Ingredients from Algae for Foods and Nutraceuticals*. Woodhead Publishing.
4. Bellinger, E. G., & Sigeo, D. C. (2010). *Freshwater Algae: Identification and Use as Bioindicators*. Wiley-Blackwell.