

Programme: M. Sc. (Botany)

Course Code: BOO-329

Title of the Course: Applied Phycology: Utilization and Management

Number of Credits: 3

Effective from AY: 2020-21

<u>Prerequisites for the course:</u>	Should have studied B. Sc. Botany.	
<u>Objective:</u>	To introduce the commercial applications of Algae and also their use in environmental management	
<u>Content:</u>	<u>1. Mariculture:</u> Scientific basis and Techniques of Mariculture Eucheuma, Porphyra and, Laminaria technique. Rafts used in Mariculture Seaweed cultivation in India <u>2. Food and food products from Seaweeds.</u> <i>Porphyra</i> as food: Cultivation and economics: Food and other uses, development of cultivation methods, present and future trends <i>Spirulina</i> as human food: Nutritional aspects. Economic and environmental aspects. Therapeutic applications, Harvesting wild populations, Village scale production, Microalgal nutraceuticals and their production Cultivated edible kelps: Edible products, kelp composition, kelp production methods, world production Some public health aspects of microalgal products. Pheophorbide, Microbial contamination, Extraneous materials, metals, organic compounds, Maintaining sanitary quality <u>3. Commercial production and application of algae: Hydrocolloids :</u> History, Chemistry production and Application, future aspects of alginates, Carrageenans, Agars. Hydrocolloid resources of India <u>Lipids and polyols</u> from microalgae History of microalgal lipid production research, Triacylglycerol, Hydrocarbon, , carotenoids, polyols <u>Hydrogen production by algae:</u> water splitting Role of algae in hydrogen production, principles of photosynthetic hydrogen production, Bio-photolysis of water. <u>Products from fossil algae:</u> Diatomite-industrial mineral, Calcareous algal fossils and their products algal kerogen in petroleum and coal, <u>4. Algae in Environmental Management</u>	3 8 8 5

	gae & Agriculture: Free living cyanobacteria and algalization, <i>Azolla</i>, Microalgal soil conditioners, Microalgal plant growth regulation, Seaweed use in agriculture and horticulture Microalgae in liquid waste treatment and reclamation. Biological waste treatment system, Design consideration (Algal concentration, algal productivity) Operation of integrated algal bacterial system, current application, future application (Sewage grown algae, energy system, toxin removal) Harmful Aspects of Algae arine dinoflagellates blooms: dynamics and impacts: Bloom dynamics: Initiation, growth, maintenance, Termination, Ecological and Economic impacts: Negative & Positive impacts. Harmful algal blooms in India Hazards of freshwater blue green algae: (Cyanobacteria) Neurotoxins, Hepatotoxins, other toxins, Medicinal aspects; Human poisoning, contact dermatitis Marine biofouling: Bacterial, Microalgal & Macroalgal biofouling, control treatments; antifouling coatings. Recent improvements in chemical control Methodology, Biological control, Non-adhesive surfaces 6. Algae in Future: Algae in space: Algae and life support systems; Algae and planetary biology, Future of algae in space. Algal Transgenics and Biotechnology	8 4
<u>Pedagogy:</u>	Lectures/ Tutorials/Assignments/Self-Study/ Visit to Research laboratories.	
<u>References/Readings</u>	Alexander, I., Railkin 2004. Marine biofouling: colonization processes and defenses. CRC Press LLC Ayhan Demirbas. 2008. Biofuels: Securing the Planet's Future Energy Needs. Springer – Verlag London Limited Chapman, V, J. and Chapman, D.J. 1975. The algae, 2nd Edition, Mac. Millan Publ. Inc. New York Craig A. Grimes., Oomman 2008. Light, water, hydrogen: the solar generation of hydrogen by water. Springer Science + Business Media, LLC David M. Mousdale 2008. Biofuels: biotechnology,	

	chemistry, and sustainable development. Taylor & Francis Group, LLC Dean, S. W., Guillermo Hernandez-Duque Delgadillo, James B. Bushman. 2000. Marine corrosion in tropical environments. American Society for Testing and Materials. Dey P. M. , Jeffrey B. Harborne 1997. Plant biochemistry, Academic Press Hans-Curt Flemming, P., Sriyutha Murthy., R. Venkatesan 2009. Marine and Industrial Biofouling.Springer Verlag Berlin Heidelberg Press Harald W., Tietze. 1999. Spirulina Micro Food Macro Blessings, Harald W. Tietze Publisher Kevin G. Sellner. Physiology, Ecology, and Toxic Properties of Marine Cyanobacteria Blooms. 2009. American Society of Limnology and Oceanography Press Linda E. Graham., James M. Graham., Lee Warren Wilcox 2009. Algae. Benjamin Cummings West Conshohocken, P.D. Féron, 2001. Marine corrosion of stainless steels. Snippet view Oskar R. Zaborsky. 1998. Biohydrogen. Plenum Press, New York Robert Edward Lee. 1999. Phycology (SPIRULINA). Cambridge University Press Raina M. Maier., Ian L. Pepper., Charles P. Gerba. 2009. Environmental microbiology (SPIRULINA). Elsevier	
Learning outcome	1. Be able to understand the role of algae in the field of Biotechnology, Environmental monitoring etc 2. Have better prospects as researchers .	