DEPARTMENT OF BIOTECHNOLOGY					*Certificate course*			
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours**	**CIA**	**Ext**	**Total**
	Certificate course		Spirulina cultivation		30	50	50	100

Course Objectives

1	To introduce fundamental concepts and methods of spirulina cultivation.
2	To train the students in comprehensive spirulina production and post-production.
3	To make the students become an entrepreneur

Unit	Description	Hours
I	**Introduction to SCP production** – historical use and rediscovery of *Spirulina, importance, morphology*, taxonomy and habitat of *Spirulina*	6
II	B**iochemical composition** - amino acids, unsaturated fatty acids andlipids, mineralsvitamins, pigments, carotenoids and phycobiliproteins. Chelating of toxic minerals.	6
III	**Cultivation and production of spirulina** -Natural production –Nutritional media ,small scale commercial production – commercial and mass cultivation (tank construction, culture medium, strain selection, scaling up of the process) – importance of light and pH in *Spirulina* cultivation –Harvesting and processing drying and packing ,Production of spirulina in organic nutrients including waste effluentspost-harvest technology and single cell protein formulation.	6
IV	**Products, uses and benefits -**Spirulina and its use by humans-Immune system enhancement,nutritional supplements, Food source, Food safety aspects related to human consumption of spirulina, Spirulina and agriculture-Use as fertilizer, Use as a protein supplement in poultry and livestock feeds, Use as a colourant in poultry, livestock and food products, Spirulina and aquaculture-Spirulina as a nutritional supplement, Spirulina as a colourant.	6
V	**Challenges and future outlook -**Maintenance of steady-state production in outdoor cultures, Controlling photo-inhibition , Decreasing dark respiration, Decreasing oxygen tension in the culture, Diurnal fluctuation in temperature, Sensitivity to high osmoticum. Gene manipulation, Plant growth regulators, Strain development and improvement, Potential use as a nutritional supplement in humanitarian emergencies.	6

Book for Reference

1. AvigadVonshak. *Spirulina platensis* (Arthrospira) Physiology, cell-biology and biotechnology, Taylor & Francis Ltd.
2. Selvendran D. 2015. Large Scale Algal Biomass (Spirulina) Production in India. In: D. Das (Ed.) Algal Biorefinery: An Integrated Approach, Springer.
3. Habib M.A.B., Parvin M., Huntington T.C. and Hasan M.R. 2008. A review on culture, production and use of Spirulina as food for humans and feeds for domestic animals and fish. FAO Fishers and Aquaculture Circular No. 1034, FAO, Rome, Italy.