Programme: M.Sc. (Marine Microbiology)

Course Code: MMO 114

Title of the Course: MARINE EXTREMOPHILIC MICROORGANISMS [T]

Number of Credits: 3

Effective from Academic Year: 2018-19

Prerequisites	Basic knowledge of extreme marine environments and their defining features is necessary.	
Objective:	This course develops concepts relating to the ability of organisms to thrive in extreme marine ecosystems, their adaptations and biotechnological potential.	
Content:		
1.	Concept of extremophiles versus conventional microbial forms and archaea	**(01)**
2.	Extreme marine econiches: marine trenches and ridges, submarine vents, deep sea basins and Antarctic sea ice and lakes	**(02)**
3.	Key Molecular components, Unique Physiological features, Adaptation strategies, significance in biogeochemical cycles of the following:	
3.1	Anaerobes: *Anaerobranca horikoshi*, *Methanobacterium thermoautotrophicu*s. Barophiles/ Peizophiles: Actinobacteria.	**(07)**
3.2	Cryophiles/Psychrophiles and Thermophiles: *Polaromonas, Shewanella, Desulphovibrio, Bacillus infernus, Aquifex, Rhodothermus.*	**(08)**
3.3	Oligotrophs, Osmophiles, Halophiles and Xerophiles: *Caulobacter, Pelagibacter; Rhodotorula*; *Marinococcus, Wallemia.*	**(06)**
3.4	Alkaliphiles, Acidophiles: *Ferroplasma, Rhodotorula.*	**(04)**
3.5	Radiophiles, Metallophiles & Xenobiotic utilizers: *Deinococcus, Geobacillus, Pseudomonas.*	**(08)**
Pedagogy:	Lectures/tutorials/assignments/self-study	
References/ Readings	Brock, T. D., Thermophilic Microorganisms and Life at High Temperatures, Springer, New York.	
	Horikoshi, K. and Grant, W. D., Extremophiles – Microbial Life in Extreme Environments, Wiley, New York.	
	Rainey, F. A., Oren, A. (2006) Extremophile microorganisms and the methods to handle them. Methods in Microbiology, 35:1-25.	

	Satyanarayana, T., Raghukumar, C., Shivaji, S. (2005) Extremophilic microbes: diversity and perspectives. Current Science, 89(1): 78-90.	
	Ventosa, A., Nieto, J. J., Oren, A. (1998) Biology of moderately halophilic aerobic bacteria. Microbiology and Molecular Biology Reviews, 62: 504-544.	
Learning Outcomes	Apply the concepts learned to understand the occurrence and ecology of marine extremophiles.	