Programme: M.Sc. (Marine Microbiology)

Course Code: MMO 112

Title of the Course: MARINE ENVIRONMENT AND PUBLIC HEALTH MANAGEMENT [T]

Number of Credits: 3

Effective from Academic Year: 2018-19

Prerequisites	It assumed that students have basic knowledge about marine environments, climate change, pollutants in marine environment.	
Objective:	This course develops concepts of Marine pollution and effect on marine biota, Climate change and impact on human health, Challenges for monitoring and control of pollution, Long term strategy in public health management; Advances in disease Control in marine environment.	
Content:		
1.		
1.1	Environmental variables related to marine, coastal and aquatic ecosystems; Water quality and sediment characteristics; Climate change and impact on human health – migration of *Vibrio*, flooding of coastline; El Nino Southern Oscillations; disaster management (outline); Understanding marine ecosystem and human health with DPSIR model.	**(05)**
1.2	Marine and coastal pollution - effects on living organisms. Water pollution - microbial changes induced by inorganic and organic pollutants, industrial effluents and domestic sewage.	**(02)**
1.3	Impact of pollutants on environment and living resources; Challenges for monitoring and control of pollution and overfishing; Standards for various types of water	**(05)**
2.		
2.1	Biological indicators and indices of water quality; Microbial indicator systems – Fecal Indicator Bacteria (FIB), uses and limitation of FIB, development of ideal indicator system (*Clostridium, Cryptosporidium, adenoviruses, Bacteroides*, Coliphages) – status, uses and limitation Sanitation in aquaculture systems.	**(05)**
2.2	Human pathogens - autochthonous and allochthonous pathogens, pathogen distribution; bacterial pathogens and diseases transmitted through marine and coastal water, faecal contamination, *Vibrio,* Wound sepsis, entero-viruses. Disease monitoring and surveillance.	**(05)**
2.3	Biological pollution – Algal blooms and environmental microflora, their effect on fish production, biological and	**(05)**

	chemical control of algal bloom, Microbial toxins, Nitrogen balance in aquatic ecosystem.	
3.		
3.1	Bioinvasion, Ballast water - impact, monitoring, rules and regulation, quarantine, certification and import risk analysis.	**(04)**
3.2	Application of health management protocols and biosecurity principles in aquaculture; Long term strategy in health management; Advances in disease control and management; Principles of SPF/SPR. Biosecurity in aquaculture.	**(05)**
Pedagogy:	Lectures/tutorials/assignments/self-study	
References/ Readings	1.Hester, R. E., Harrison, R. M., Marine Pollution and Human Health, Vol. 33, Issues in Environmental Science and Technology, Royal Society of Chemistry. 2.Belkin, S. and Colwell, R. R., Oceans and Health: Pathogens in Marine Environment. Springer Publishers. 3.Stoskopf, M. K., Fish Medicine, W. B. Saunders Company, Philadelphia. 4.Noga E. J., Fish Disease: Diagnosis and Treatment, Wiley-Blackwell Publishers. 5.Plumb, J., Health Maintenance and Principal Microbial Diseases of Cultured Fishes, Blackwell Publishing. 6.Subba Rao, N. S., Soil Microbiology, Oxford and IBH Publishing. 7.Rheinheimer, G., Aquatic Microbiology, John Wiley Publishers. 8.Clark, R. B., Frid, C., Attrill, M., Marine Pollution, Oxford University Press. 9.Wedemeyer, G. A., Meyer, F. P. and Smith, L., Environmental Stress and Fish Diseases, TFH Publications, Neptune, New Jersey. 10.Plumb, J.A. and Hanson, L.A. Health Maintenance and Principal Microbial Diseases of Cultured Fishes. Wiley-Blackwell Publishers. 11.Buller, N. B. and Plumb, J. A., Bacteria from Fish and Other Aquatic Animals: A Practical Identification Manual, CABI Publishing.	
Learning Outcomes	1) Explains concept of Marine pollutants, climate change and their effect on marine biota and humans. Management of Ballast water, bioinvasion and spread of disease globally. 2) Applying Long term strategy in public health management and advances in disease Control in marine environment.	