Name of the Program: M.Sc. Marine Microbiology
Course Code: MMI-525
Title of the Course: Fishery Microbiology
Number of Credits: 03
Effective from AY : 2022 - 23

Prerequisites for the course:	Knowledge of microbial diversity.	
Objective:	Develop the knowledge of fishes, fisheries, aquaculture in India. Develop the concepts of various infectious diseases present in fishes and spread through fishes.	
Content:	**Module I** Introduction to Indian Fisheries: pelagic and benthic resources, exploitation, craft and gears used, oceanographic processes affecting capture fisheries. Blue economy, semi-intensive culture systems, use of Prebiotics and Probiotics, SPF and SPR. Microbiology of Raw fish and processed fish. Adverse effects of microbial spoilage and PHFL in blue economy. Fish processing methods: biopreservation, food processing, fermentation and aquaculture; effect of heat, chilling, freezing and chemical preservatives on bacteria, yeasts and fungi associated with fishes. Quality control and regulations for fishes, shellfish and marine living resources. **Module II** Microbes associated with fish and shellfish: Commensals and pathogens; Classification of diseases; Methods of disease prevention; Detailed study of bacteria pathogenic to finfish and shellfish with emphasis on morphology, epidemiology, pathogenesis, treatment and control: *Flavobacterium, Edwardsiella, Vibrio, Aeromonas, Renibacterium, Yersinia, Mycobacterium.* Viral infections: White Spot Syndrome Virus (WSSV), Monodon Baculo Virus (MBV), Yellow Head virus (YHV), Hepatopancreatic Parvo Virus (HPV), Infectious Hypodermal and Hematopoeitic Necrosis Virus (IHHNV), EUS. Ecto and endoparasitic infections. **Module III** Marine toxins and Human bacterial pathogens: Human bacterial pathogens associated with fishes and their products - *Clostridium perfringens, Listeria spp., Plesiomonas, Vibrio cholerae, Vibrio*	15 hrs 15 hrs 15 hrs

	parahaemolyticus, Vibrio vulnificus and common *Enterobacteriaceae.* Marine toxins – Paralytic Shellfish Poisoning (PSP) Toxins, Amnesic Shellfish Poisoning (ASP) Toxins, Diarrhetic Poisoning Toxins, Lipophilic Shellfish Toxins (LST), Neurotoxin Shellfish Poisoning (NSP) Toxins, Venerupin shellfish poisoning, Ciguatera toxins, tetradotoxins, Azaspiracids, Cyclic Imines and their origin.	
Pedagogy:	Lectures/ assignments/ self-study	
References/ Readings:	1. Fernandes R. (2009). Microbiology Handbook: Fish and Seafood. RSC Publishing. London. 2. Woo P. & Bruno D. (2011). Fish Diseases and Disorders, Vol 3: Viral, Bacterial and Fungal Infections (2nd edn) CABI Publishers. United Kingdom. 3. Roberts R. J. (2012). Fish Pathology (4^{th} edn). Wiley-Blackwell Publishers. New Jersey. 4. Hoole D., Buck D., Burgess P., & Welby I. (2011). Diseases of Carps and Other Cyprinid Fishes, Wiley-Blackwell Publishers. New Jersey. 5. Sindermann C.J. (1970). Principle Diseases of Marine Fish and Shellfish (1st edn). Academic Press of NewYork and London. 6. Noga E. C. (2010). Fish Disease: Diagnosis and Treatment (2^{nd} edn). Wiley-Blackwell Publishers. New Jersey. 7. Leatherland J. F. & Wook P. K. T. (2006). Fish Diseases and Disorders (2^{nd} edn) CABI Publishers. United Kingdom.	
Course Outcomes:	1. Garner knowledge of wide diversity of marine and coastal ecosystems in terms of fishes, shrimps, etc. 2. Apply the principles of microbiology to a range of interactions between microorganisms and fishes. 3. Compare various microbial infections in fishery resources and their implications. 4. Assess the influence of zoonotic infections on fish and human health.	