

Programme: M.Sc. Marine Biotechnology

Course Code: MBC 186

Title: OCEANOGRAPHY & MARINE BIORESOURCES

Number of Credits: 3

Effective from 2019-2020

Course objectives	• Introduce students to marine environment and its physical features; • Introduce students to marine life, their habitats and adaptations.	
Learning Outcomes	Upon successful completion of this course, students should be able to: • Understand status and trends of major marine resources - understand how oceans influence the climate • Familiarise with factors influencing primary and secondary production.	
Content:	MODULE I (Marine life diversity and processes) • Classification of marine environment • Marine bio resources. • Marine microbes (viruses, bacteria, archaea, protists, fungi) • Marine algae and plants (seaweeds, sea grasses, mangrove plants) • Invertebrates: sponges, cnidarians, polychaetes, crustaceans, marine worms, molluscs, echinoderms, arthropods, Non-craniate (non-vertebrate) chordates, • Adaptations of organisms to different habitats • Vertebrates ✓ Marine fishes (bony, cartilaginous, jawless fishes) ✓ Marine tetrapods (amphibians, reptiles, birds, mammals) • Plankton (phytoplankton and zooplankton) • Bio-communication in oceans, Microbe-microbe interaction, Quorum sensing, Microbe-metazoan interaction, Population connectivity, • Species abundance, richness and diversity indices, Biogeography, Recruitment, Growth, Mortality, Culture of microalgae and invertebrates; • Marine biomass and productivity - primary production, photosynthetic efficiency; secondary production, productivity distribution in ocean environment, Mechanism and factors affecting primary production, • Food web dynamics and ecosystem functioning, Microbial loop - Role of microbes in marine food web dynamics, – • Biogeochemical processes: Nutrient cycling, carbon cycle, Nitrogen cycle, Sulphur cycle, Iron cycling, Phosphorus cycling and other cycles. MODULE II (Physical Oceanography)	12 hours 12 hours

	• Ocean atmosphere interface • Circulation: Coriolis effect, Ekman transport, Langmuir circulation. • Planteray waves: Kelvin and Rossby waves. • Climate variability: Pacific decadal oscillation, North Atlantic oscillation, and Arctic oscillation, thermohaline circulation • El Niño-Southern Oscillation: El Niño & La Niña and its effect on global climate • Ocean currents: Antarctic Circumpolar Current, Deep ocean (density-driven), Western boundary currents (Gulf Stream, Kuroshio Current, Labrador Current, Oyashio Current, Agulhas Current, Brazil Current, East Australia Current); Eastern Boundary currents (California Current, Canary Current, Peru Current, Benguela Current) • Ocean gyres: Major gyres, Tropical gyres, Subtropical gyres, Subpolar gyres • Tides, Tsunamis, Wind waves and its effects MODULE III (Chemical Oceanography) • Seawater composition and its properties • Characterization of sediments: constituents, texture and mass properties • Types of Biogeochemical cycles in oceans • Isotope geochemistry • Oceanic anoxic events and dead zones • Biological pump • Ocean acidification and its significance • Plate tectonics, Mid-oceanic ridge spreading and convection.	12 hours
References/ Reading	1. Carl E. Bond (1996) Biology of Fisheries, 2nd Edition , W.B. Saunders Company. Philadelphia 2. Heywood V.H. , (1995) Global Bio Diversity Assessment. UNEP, Cambridge University Press PP.1140 3. Kortzinger, (2004). The Ocean takes a Breath, Science 4. Agarwalk et. al., (1996) Biodeversity and Environment. APH, pp351 5. Naskar K. and Mandal R., (1999) Ecology and Biodeveristy of Indian Mangroves . Daya.pp361. 6. Jeffrey S. Levinton, CD(2001). Marine Biology: Function, Biodiversity . Ecology (515pp) 7. Bertness, M. D., Bruno, J. F., Silliman, B. R., & Stachowicz, J. J. (Eds.). (2014). Marine community ecology and conservation. Sinauer Associates, Incorporated. 8. Chambers, R. C., & Trippel, E. A. (Eds.). (2012). Early life history and recruitment in fish populations (Vol. 21). Springer Science & Business Media. 9. Pickard, G. L., & Emery, W. J. (2016). Descriptive physical oceanography: an introduction Elsevier.	

	10. Knauss, J. A., & Garfield, N. (2016). Introduction to physical oceanography. Waveland Press. 11. Beer, T. (2017). Environmental oceanography. CRC Press.	
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