# UNIVERSITY OF MADRAS

## B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS WITH EFFECT FROM 2023-2024

| Course Code | Course Name | Category | L | T | P | S | Credits | Inst. Hours | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CIA | External | Total |
| **21DSEE** | **BASICS OF MARINE BIOLOGY** | DSE | Y | - | - | - | 3 | 4 | 25 | 75 | 100 |

**Learning Objective**

1. To understand and learn the physical, chemical and biological aspects of marine environment and to gain knowledge about the management of oceans.
2. To introduce students to the marine environment and its indigenous organisms.
3. To study the principles, concepts and facts through which the student can better understand and appreciate the nature of the sea and its inhabitants.
4. To acquaint the student with the characteristics used to identify and classify marine plants and animals and to develop an awareness of the career possibilities available to students in this area.

**Unit I: Marine Ecology** : Marine environment- ecological factors- light, temperature, salinity, pressure; Classification of marine environment; Pelagic environment – Planktonic and Nektonic adaptations; Benthic environment - intertidal, interstitial and deep sea adaptations; Distribution and ecological role of other coastal environments - coral reefs, estuaries, mangroves, seagrass beds, kelp forests polar seas and hydrothermal vents.

**Unit II: Physical Oceanography :** Physical Properties of Seawater- density, viscosity, surface tension, conductivity and their relationship; temperature distribution in the sea - heat budget, UV radiation; El Nino/La Nina – global impact; Dynamics of the ocean-general surface circulation, Waves, Currents and Tides, Tsunami.

**Unit III: Chemical Oceanography** : Chemical composition of seawater- ionic, major and minor constituents, constancy- ionic compositions and factors affecting constancy- major and minor elements, trace elements- their importance, distribution. Chemistry of seawater constituents- concept of chlorinity and salinity - methods of measurements, nutrients - biogeochemical cycles.

**Unit IV: Biological Oceanography :** Sea as a biological environment- Plankton- classification based on size, mode of life and habitat. Phytoplankton and Zooplankton - methods of collection, estimation of standing crop-wet and dry weight estimation-plankton volume settling and displacement methods.Oxidation as carbon (as organic matter).Primary productivity – estimation and factors affecting primary productivity.

**Unit V: Marine Pollution and Ocean Management** : Ocean pollution- kinds and quantities of pollutants, toxic effects and control measures – oil spills, plastics, nuclear waste disposal in marine environment, Eutrophication. Role of National and international agencies and organizations in ocean management-FAO, UNEP, DOD, WOCE, WHOI, IOI Malta, IMO INMARSAT- IUCN, SCAR, SCOR, Marpol, Traffic. Ocean policy (India) - research and management.

**Text Books**

1. Thurman, Harold., 2001 Introduction to Oceanography, Prentice Hall Inc. New Jersey. 506 pp.

2. Bertness, M.D, S. D. Gaines and M.K. Hay 2000. Marine Community Ecology Sinauer Associates.

3. Grant Gross, M., 1993 Oceanography: A view of the earth (sixth edition). Prentice Hall Inc. New Jersey.

4. Fincham A. A, 1984.Basic Marine Biology. Cambridge University Press, England. 157 pp.

5. John Resech Jr.1979, Marine Biology. Reston Publishing Company, Virginia. 257 pp.

**Suggested Readings**

1. Barbara E. Curry, 2016. Advances in Marine Biology, Volume 74, Ist Edition. Academic Press ISBN: 9780128036075

2. Peter Castro, Michael E. Huber, 2015. Marine Biology; Series Botany, Zoology, Ecology and Evolution.McGraw-Hill Education.

3. Philip V. Mladenov, 2013 Marine Biology: A very short introduction, Ist Edition. Oxford University Press.

4. Venkataraman K, Raghunathan C, Raghuraman R, Sreeraj C. R, 2012. Marine diversity in India.Zoological Survey of India, Kolkata.178 pp.

5. Amy Hill. 2002. Marine Biology: An Introduction to Ocean Ecosystems (Marine Biology Ser) Walch publishing.

6. Pickard, G.L. and W.J. Emery 1995. Descriptive Physical Oceanography. PergamonPress,London.

7. Gage. J.D. and P.A. Tyler, 1991. Deep Sea Biology, Cambridge University Press,Cambridge

8. Raymont J. E. G., 1980. Plankton and Productivity in the oceans: Volume 1: Phytoplankton, Pergamon Press.

9. Van Der Spoel, S. and PierrotBults, A. C (Eds) 1979.Zoogeography and diversity of plankton.Bungs Scientific Publishers Utrecht, 410pp.

10. Riley, J.P. and Skirrow, 1975-1984. Chemical Oceanography Vols. 1 to 8. Academic Press,London

**Web Resources**

1. https://www.livescience.com
2. https://www.icriforum.org
3. https://www.cbd.int

**Course Outcomes (COs)**

1. Define marine ecosystem, recognize and describe the interrelationship between biology and ocean technology.
2. Articulate and classify the dynamics and the physical attributes of the ocean, interpret the factors which affect the global climate.
3. Identify and analyze the physical and biological factors of marine environments, and focus life in the open sea.
4. Evaluate the impact of variations in abiotic factors in marine productivity and justify the role of human activities in the degradation of marine ecosystems.
5. Categorize marine pollutants and develop controlling measures in collaboration with the institutions for ocean management.