

## SEMESTER I

**Programme:** M. Sc. (Marine Sciences)

**Course Code:** MSC 161

**Title of the Course:** Physical Oceanography I

**Number of Credits:** 03

**Effective from AY:** June, 2018-19

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| <b>Prerequisites for the course:</b> | Degree of Bachelor of Science of this University or an examination of any other University recognized as equivalent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| <b>Objective:</b>                    | Students with any branch in science at their graduation level are eligible to get admission to PG in Marine Science. Ocean, being a dynamic ecosystem, to know the biology, geology and chemistry of the Ocean, it is imperative to know different physical process responsible to drive the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| <b>Content:</b>                      | Oceanographic explorations - Evolution of theoretical ideas – Units used in Oceanography- The role of observations in Oceanography –Ocean and seas - Dimensions of the ocean- Physical properties of water- Influence of dissolved salts-Physical properties of seawater-Salinity – Temperature-Density- Distribution of temperature - salinity and density in space and time- Oceanic mixed layer and thermo-cline – Measurement of temperature and salinity - Sound in the sea. Propagation of sound in the sea- Light in the sea – The Oceanic heat budget.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12 hours |
|                                      | The earth in space – Atmospheric wind systems – Composition of atmosphere - Vertical extent of atmosphere -Planetary boundary layer – Measurement of wind – Calculations of wind stress - Coriolis force- General circulation of atmosphere-Atmospheric temperature -Temperature system and scales - Atmospheric humidity - Vapour pressure - Circulation – Wind- driven and thermo-haline circulations – Importance of deep circulation – Theory for deep circulation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12 hours |
|                                      | Equatorial processes - El Nino – El Nino tele-connection - Southern Oscillation and Indian Ocean Dipole (IOD) - Indian Ocean Circulation. T.S.V. diagram- T.S. diagram - Oceanic fronts -Upwelling - Water masses in the ocean - Bottom water - Deep water - Antarctic intermediate water - Central water - Lagrangian and Eulerian methods for measuring currents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12 hours |
| <b>Pedagogy:</b>                     | The course is being taught adopting conventional method of class room teaching using chalk and board. However, after each module an integral picture is drawn to them through power point presentation. In addition students are given seminar topics related to the course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |
| <b>References/ Readings</b>          | <ol style="list-style-type: none"> <li>1. The Ocean: Their Physics, Chemistry and Biology, 1962 - Sverdrup, H.U., Johnson, M.W. and Flemming, R.H., Asia Publ. House, New Delhi.</li> <li>2. Descriptive Physical Oceanography: An Introduction, 1989 - Pickard, G.B. and Emery, W.J., Pergamon press, U.K.</li> <li>3. Principles of physical oceanography, 1966 - Pierson, W.J. and Newmann, G.S., Prentice Hall, Inc., New Jersey, U.S.A.</li> <li>4. Meteorology Today: An Introduction to weather, climatic and the environment (2<sup>nd</sup> edn), 1985 - Ahrens, St. Paul, West Publ. House, U.K.</li> <li>5. Meteorology: Forecasting the weather, 1973 - Wachter, H., Collins Publ., U.K.</li> <li>6. The Atmosphere and Ocean: A physical Introduction, 1986 - Wells, N., Taylor and Francis Ltd., U.K.</li> <li>7. General Climatology, 1960 - Critchfeild, H.J., Prentice Hall Inc., New Jersey, U.S.A.</li> <li>8. Introduction to Micrometeorology, 2<sup>nd</sup> edition, 2001 - S. Pal Arya, Vol 79 in International geophysics Series, Academic press.</li> </ol> |          |
| <b>Learning Outcomes</b>             | Getting a larger picture of a coupled ocean – atmosphere and the different process involved in controlling the ecosystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |