Programme: M. Sc. (Marine Sciences)
Course Code: MSC 466 Title of the Course: Dynamic Oceanography – II
Number of Credits: 02
Effective from AY: June2018-19

Prerequisites for the course:	Students undergoing course in any branch of Marine Sciences.	
Objective:	This course is introduced to train the students in the application of various aspects of Physics and those learned under geophysical fluid dynamics in the III semester to Ocean dynamics. One of the country's requirements in the field of ocean and atmospheric research is numerical modelers, who model various dynamics of different time scales. Especially when the country's economy is agrarian for which monsoon is in important ingredient. Hence fundamentals of numerical modeling too are included in the syllabus.	
Content:	Currents with friction – The equation of motion with friction: Transport and upwelling – Bottom friction and shallow water effects – Ekman's solution to the equations of motion with friction .Limitation to Ekman's theory – Sverdrup's solution for the wind driven circulation – Stommel's contribution – The planetary wind field, upwelling and sinking with special reference to the Indian ocean — Westward intensification – equatorial current system – Munks equation - Boundary layer approach to obtain a solution to Munk's equation – The mixed layer of the ocean. Co-ordinate system – Governing equations – Boundary conditions layer averaged equations – Staggered grid systems – Finite difference method- Model spin up time-Model stability condition.	12 hours 12 hours
Pedagogy:	Though the course is taught in class room, a significant component of ocean dynamics (especially important publications) used to be presented in student's seminar.	
References/ Readings	1. Introductory Dynamical Oceanography, 1983 – Pond, S and Pickard, G.H., Pergamon Press, U.K. 2. Principles of Physical Oceanography, 1966 – Newman, G. and Pierson, W.J., Prentice Hall, Inc., New Jersey, U.S.A. 3. Physical oceanography (Vol.1) 1961 – Defant, A., Oxford Pergamon press, U.K. 4. The dynamics of the upper ocean (2nd edition) 1977 – Phillips, O.M., Cambridge Univ. Press, U.K. 5. Modeling and prediction of the upper layers of the ocean, 1977 – Krous, E.B. (Ed.), Pergamon press 6. Modeling of marine systems, 1986 – Nihoul, J.C.J., Elsevier Scientific Publ.Co. Oxford, U.K. 7. Atmosphere – Ocean Dynamics, 1982 - Gill, Adrian E, International Geophysics, 30 Academic press, New York.	
Learning Outcomes	Trained manpower in the field of Ocean dynamics with good Knowledge in the modeling aspect.	