COURSE TITLE:

HYDRODYNAMICS OF ENVIRONMENTAL FLOWS

COURSE DESCRIPTION:

Effects of Earth's rotation (Coriolis and centrifugal forces), Navier-Stokes equation in rotating reference frames, dimensionless form of equations, Rossby number, Froude number, dynamical pressure, geostrophic equilibrium, Taylor-Proudman theorem, linearization of the equations, wave phenomena in rotating fluids, shallow water equations, conservation of potential vorticity, effects of surface curvature, Ekman boundary layers, upwelling and downwelling, effects of density stratification, thermal wind, Boussinesq approximation, baroclinic instability.

LITERATURE:

Benoit Cushman-Roisin: Introduction to Geophysical Fluid Dynamics. Prentice Hall, 1994.

Geoffrey K. Vallis: Atmospheric and Oceanic Fluid Dynamics: Fundamentals and Large-scale Circulation. Cambridge University Press, 2006.

Jorg Imberger: Environmental Fluid Dynamics. Academic Press, 2012.

TEACHER:

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professor