ICTP DIPLOMA PROGRAMME IN EARTH SYSTEM PHYSICS 2013-14

SYLLABUS

FLUID MECHANICS - [12 lectures: 18 hours] - R. Farneti

1 Introduction to Fluid Mechanics and Properties of Fluids I

2 Properties of Fluids II and Statics

3 Scalars, Vectors, Tensors, Gradient, Divergence, Curl

4 Kinematics: Material derivative, streamline, streamfunction, strain rates, relative motion near a point, Vorticity and circulation

5 Conservation laws I: Mass, tracer, Advection-Diffusion Equation

6 Conservation laws II: Momentum and the Navier-Stokes Equations

7 Conservation laws II: Energy and Bernoulli equations

8 Boussinesq approximation and the Governing equations of Geophysical Fluid Dynamics

9 Dynamic similarity / Instabilities: Rayleigh-Benard Convection, Kelvin-Helmholtz instability

10 Geostrophic flow and Vorticity dynamics

11 Linear waves: Kelvin, Poincare', Rossby

12 Stratification and Internal waves

NOTE: THIS IS A TENTATIVE SCHEDULE AND MAY BE REVISED DURING THE COURSE.
TEXTBOOKS: any textbook on Fluid Mechanics, but particularly: `Fluid Mechanics' by P. K. Kundu and `Physical Fluid
Dynamics' by D. J. Tritton.