

MATH0024 (Geophysical Fluid Dynamics)

Year: 2018–2019
Code: MATH0024
Level: Advanced
Value: 15 UCL credits (= 7.5 ECTS credits)
Term: 2
Structure: 3 hour lectures per week
Assessment: 100% examination
Lecturer: Prof ER Johnson

Course Description and Objectives

This course uses mathematics to discuss the global environment. Basic fluid dynamics and simple physics for the atmosphere and oceans are used to discuss some of the mechanisms involved in the dispersion of pollutants along coasts and the four-yearly (on average) El Nino oscillation in the equatorial Pacific, with its attendant Australia drought and blight of the Peruvian anchovy industry. Typical analysis involves the solution of linear partial differential equations for the velocity and density of the flows.

An idea of the methods and topics and level required can be obtained from the books (in order of relevance).

- (i) *Geophysical Fluid Dynamics*, J Pedlosky, Springer-Verlag.
- (ii) *Atmosphere-Ocean Dynamics*, A E Gill, Academic Press.
- (iii) *Waves in the Ocean*, P H Le Blond and L Bysak, Elsevier.

Detailed Syllabus

Wave in rotating flows: inertial waves, Poincaré waves, Kelvin waves. The spherical earth and Rossby waves. Viscous effects, the Ekman boundary layer and Ekman spiral. Stratified flows: internal waves and flow over mountain ridges. Ocean circulation: the Sverdrup and Stommel models.