Intitulé de l'Unité d'Enseignement	**Introduction to environmental fluid dynamics**	Code de l'UE	C7

Rédacteurs (principaux, 3 maxi) de l'UE			
Nom, Prénom, qualité	Colm Caulfield		
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Descriptif de l'UE	
Volumes horaires globaux (CM + TD + TP+ autre…)	15 h
Nombre de crédits de l'UE	1.5 ECTS
Spécialité où l'UE est proposée	M2 Fluid Mechanics
Semestre où l'enseignement est proposé	S3
Effectifs prévus (rentrée 2009)	

Objective

Fluid flows are everywhere in the natural environment. In many circumstances, fluid density stratification plays a central role in the flow dynamics, often in modifying turbulent, disordered motions. This interaction between flow turbulence and stratification can manifest itself in surprising, and non-intuitive ways, which nevertheless are key to describing and understanding the world in which we live. In this course, the rich and fascinating behaviour of some environmentally important density-stratified flows is explored. Particular attention will be paid both to developing physical intuition, and to using appropriate mathematical modelling skills to gain insight. After an introduction to the appropriate stratified version of the underlying equations of fluid motion and identification of the range of scales of interest, this course will consider four main topics, and will use simple table-top laboratory demonstrations and videos where appropriate

Lecturer

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Content

1) Internal gravity waves (ie the waves which are ubiquitous in fluids with vertical variations in density).
2) Turbulent plumes (ie isolated sources of buoyancy) in the natural and built environment.
3) Gravity currents (eg the sea breeze, sandstorms, avalanches, accidental industrial releases).
4) An introduction to the dynamics of turbulent stratified mixing.

Requirements : A course in fluid mechanics describing the unstratified, incompressible, finite Reynolds number Navier-Stokes equations.

Evaluation mechanism : Written examination