

MASTER PHYSIQUE

## PARCOURS PHYSIQUE OCÉAN ET CLIMAT

### semestre 7 Physique POC

## Fluides 1

### Présentation

This course aims at introducing Fluid Mechanics to non specialists, starting from classical mechanics. It establishes the equations governing homogeneous incompressible fluids (statics, kinematics, dynamics, vorticity dynamics) and solves them for steady flows, irrotational flows, viscous flows, surface waves. It gives applications to aerodynamics, hydrodynamics and hydraulics.

This course is taught in English

#### 5 crédits ECTS

Volume horaire

Cours Magistral : 18h

Travaux Dirigés : 24h

Travaux Pratiques : 4h

Autres : 4h

### Objectifs

Objective of the course:

this is the basic course upon which specialized fluid dynamics courses (GFD, fluid-solid interactions) will be based.

### Pré-requis nécessaires

Pre-requisites:

mathematical analysis : ODEs, PDEs (preferably), real functions of several variables, geometry of curves and surfaces, vector analysis ;

physics : classical mechanics, electrostatics (electromagnetism), thermodynamics

### Compétences visées

this course builds up know-how and abilities:

ability to identify scientific questions

ability to use these results for scientific projects

ability to validate numerical results with theoretical results

use for problem solving in fluids

contributes to a global approach (holistic approach) to problem solving

use for building numerical algorithms for professional purposes

### Descriptif

Contents

Introduction/description of fluids, from microscopics to macroscopics

fluid statics

fluid kinematics and deformation

fluid dynamics

vorticity

steady flows

irrotational flows

aerodynamics and hydrodynamics

boundary layers

viscous flows

surface waves

hydraulics

### Modalités de contrôle des connaissances

### Session 1 ou session unique - Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
Autres	CC	Ecrit - devoir maison		50%	
	CT	Oral	30	50%	

### Session 2 : Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Oral	30		