

MASTER PHYSIQUE

## PARCOURS PHYSIQUE OCÉAN ET CLIMAT

### semestre 7 Physique POC

# Mathématiques Appliquées 1

## Présentation

The 1st applied maths course is designed to provide the student with analytical tools for physics, such as ODE solutions, perturbations methods, Lyapunov exponents...

It is followed by the 2nd applied maths courses which focuses on the (mainly linear) partial differential equations for physics (fluid mechanics in particular).

### 4 crédits ECTS

Volume horaire

Cours Magistral : 15h

Travaux Dirigés : 17h

## Objectifs

To acquire the mathematical tools necessary for many problems in the engineering sciences (aerodynamics or hydrodynamics, calculation of structures, etc.) or useful in Master 2 in these fields.

## Pré-requis nécessaires

Integration of linear ordinary differential equations.

## Compétences visées

- > Know the basic methods for discussing solutions of ordinary differential equations.
- > Develop approximate solutions in the form of asymptotic developments when a small parameter can be identified in the equations.

## Descriptif

I. Reminders and mathematical complements: Ordinary differential equations of order 1 and 2 with constant coefficients - Integer series.

II. Characterization of solutions of linear and non-linear differential equations:

1. Notion of flow, phase portrait, reminder on the existence and uniqueness of solutions.
2. Linearization around an equilibrium and notion of stability. Introduction to the Lyapunov method for equilibrium stability.

III. Determination of approximate solutions of second order differential equations :

1. Perturbation methods and notion of asymptotic expansion.
2. Application to differential equations

## Modalités de contrôle des connaissances

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

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Ecrit - devoir surveillé	120	2/3	
	CC	Autre nature		1/3	

### Session 2 : Contrôle de connaissances

Nature de l'enseignement	Modalité	Nature	Durée (min.)	Coefficient	Remarques
	CT	Oral	45		