MA2620
Ordinary Differential Equations and Dynamic Systems

Professor: Laurent Dumas

Language of instruction: French – **Number of hours**: 36 – **ECTS**: 3

Prerequisites: None

Period: S8 Elective 10 February to June IN28IE3, SEP8IE3

Course Objectives

The first part of this course is devoted to ordinary differential equations (existence, uniqueness, numerical methods). Then, an introduction to dynamical systems will be presented: linear and non linear cases, Lyapunov functions, gradient flow systems, Hamiltonian systems. This course will be illustrated by various examples taken from physics, economy and biology, and will be completed by computational sessions with Matlab/Scilab.

On completion of the course, students should be able to

follow advanced courses based on dynamical systems.

Course Contents

- Ordinary Differential Equations : Cauchy Lipschitz theorem, numerical methods
- Linear dynamical systems : : equilibrium points, stability, local behavior.
- Non linear dynamical systems : linéarization, Lyapunov function.
- Special cases : gradient flow systems, Hamiltonian systems.
- Cases taken from physics, economy and biology.

Teaching Material and Textbooks

Course reader of similar courses (in French).

http://dumas.perso.math.cnrs.fr/ecp2014.html

Evaluation

The score is composed of half a score of continuous control and score of the final written exam 3 hr (with support)