Master Course Seminars A.A. 2021/22 (4 hours):

Perturbative methods:
tools to solve nonlinear problems

Instructor: Sandra Carillo

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Seminars Description: The aim of these Seminars is to provide some ideas on methods to study nonlinear problems modelled via nonlinear ordinary differential equations. Specifically, a brief overview on *ad hoc* methods developed when a *small* parameter appears is given. The examples of weakly damped oscillator (toy problem) and the physical pendulum are considered to illustrate the methods.

Timetable:

- Monday March 21, 17.30 -19.30

- Monday March 28, 17.30 -19.30

  The arguments can be schematically listed in:

a) **Qualitative methods: an introduction.**

b) **Straightforward Perturbation Method.**

c) **Multiple Scale Method.**

The results are visualised via computer algebra manipulation (MATLAB' Tollbox).

Texts: Selected Chapters from

- M.H.Holmes, *Introduction to Perturbation Methods*, M.H.Holmes, Introduction to Perturbation Methods, Springer, New York, 1995; **Author(s):** M.H.Holmes; **ISBN-13:** 978-0000000000

- M. Lo Schiavo, *Note di sistemi dinamici*, SIMAI e-Lecture Notes, Vol 12 (2013) `http://cab.unime.it/journals/index.php/lecture/article/view/928`, **ISBN-13:**978-88-905708-5-8

- Further material is provided by the Instructor.