Faculty of Applied Sciences

INMA1315   Mathematical analysis : complements

[30h+22.5h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s):   Luc Haine
Language: French
Level: First cycle

Aims

The course discusses several topics in analysis, which are chosen as an introduction to the theory of dynamical systems and partial differential equations.
Methods and competences to be acquired by the students. To get a firm grasp of the techniques of differential calculus, measure theory and Lebesgue integration, and to be able to apply them to simple problems in the theory of dynamical systems.

Main themes

Topics in analysis in the areas of differential calculus, differential equations, measure and integration theory. Applications to the theory of dynamical systems.

Content and teaching methods

-Differential calculus in normed spaces of finite and infinite dimension. Implicit functions theorem. Applications to submanifolds in Rn.
-Elements of dynamical systems theory: flow boxes, linearization, Poincaré map, gradient flows.
-Measure theory and Lebesgue integration: Lebesgue dominated convergence theorem and applications, Fubini's theorem, change of variables, Stokes formula. Fractal dimension and Poincaré recurrence theorem.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites : Mathematics 1, 2 et 3, MAT1223.
Evaluation : projects during the semester and a final written exam.
Support : the theoretical course will be based on references given to the beginning of the course and will be completed by a weekly problem session.

Other credits in programs

FSA13BA	Troisième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)