Faculty of Applied Sciences

INMA2315   Methods of analysis for differential and integral equations

[30h+22.5h exercises] 5 credits

This course is taught in the 1st semester

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

Aims

. To give the necessary background to follow the courses in analysis of the master's degree in mathematics, in particular a modern approach 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 basic notions in measure and integration theory, in Fourier analysis and in functional analysis, in view of applications to differential and integral equations.

Main themes

Supplementary chapters of analysis in the areas of measure and integration theory, as well as of Fourier analysis. Introduction to functional spaces. Applications to differential and integral equations.

Content and teaching methods

-Metric and Banach spaces. Compactness, Arzelà-Ascoli theorem, Banach contraction theorem, Schauder's theorem. Applications to ordinary differential equations, Cauchy problem.
-Measure theory and Lebesgue integral. Lebesgue dominated convergence theorem, Fatou's theorem. Applications.
-Hilbert spaces and Fourier analysis. Riesz Theorem, Hilbert-Schmidt Theorem. Applications to Sturm-Liouville type problems and to integral equations.

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

Prerequisites : Mathematics 1, 2 et 3.
Evaluation : two projects during the semester and a final written exam.
Support : syllabus, weekly problem session.

Programmes in which this activity is taught

MAP2   Ingénieur civil en mathématiques appliquées

Other credits in programs

MAP21	Première année du programme conduisant au grade d'ingénieur (5 credits) civil en mathématiques appliquées	Mandatory
MAP23	Troisième année du programme conduisant au grade (5 credits) d'ingénieur civil en mathématiques appliquées	