



# Faculté des sciences appliquées

**FSA**

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:** 2nd cycle course

### 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.

### Other credits in programs

<b>MAP21</b>	Première année du programme conduisant au grade d'ingénieur (5 credits) civil en mathématiques appliquées	Mandatory
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