UCLouvain

linma1315

2020

Mathematical analysis : complements

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 22.5 h	Q2

Teacher(s)	Absil Pierre-Antoine ;Van Schaftingen Jean ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	This course covers themes in mathematical analysis (measure theory, functional analysis and function spaces) that play a role in the foundations of various areas of applied mathematics such as dynamical systems, partial differential equations, optimal control, scientific computing, stochastic processes and financial mathematics.
Aims	AA 1.1, 1.2, 1.3, 3.1. At the end of the course, the student will be able to: 1 1. by means of examples, statements and mathematical proofs, describe infinite-dimensional spaces, including their operators and convergence notions, and compare them to finite dimensional spaces, 2. apply definitions and results of measure theory to the study of function spaces and probability theory, 3. use advanced concepts of measure theory and functional analysis in applied mathematics. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** • Homeworks, exercises, tests or practical work carried out during the semester • Exam More elaborate information on the evaluation procedure is given in the course outline, made available on Moodle at the beginning of the academic year.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The course includes interactive lectures and exercises. The emphasis is on critical understanding of the theory and active problem solving.
Content	Important concepts and results within the main themes of the course, such as: • Measure theory, Lebesgue integral, convergence theorems, • Complete metric spaces, Banach spaces and Hilbert spaces, spaces of continuous functions, spaces of integrable functions, • Continuous linear mappings, weak convergence, Riesz representation theorem, notions of spectral theory, • Distributions and Sobolev spaces.
Bibliography	Livre de référence : Gerald Teschl, "Topics in Real and Functional Analysis" disponible gratuitement en ligne à l'adresse (https://www.mat.univie.ac.at/~gerald/ftp/book-fa/).
Other infos	
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Minor in Applied Mathematics	LMINOMAP	5		
Specialization track in Applied Mathematics	FILMAP	5		