


5.00 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.
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <ul style="list-style-type: none"> • AA1.1, AA1.2, AA1.3 • AA3.1 <p>At the end of the course, the student will be able to:</p> <ul style="list-style-type: none"> • 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; • apply definitions and results of measure theory to the study of function spaces and probability theory; • use advanced concepts of measure theory and functional analysis in applied mathematics.
Evaluation methods	<ul style="list-style-type: none"> • Activities carried out during the term: homework assignments, classroom exercises, project reports, presentations, supervision meetings with the teachers or TAs during office hours, or laboratory work. These activities are thus organized (and evaluated) only once per academic year. The activities will be announced via the News forum on Moodle. • Exam: written, or oral depending on the circumstances. <p>The final grade is $1/5 D + 4/5 E$, where D is the grade of the activities carried out during the term and E is the grade of the exam. Any violation of the instructions provided on Moodle, for any activity, may lead to a global grade $D = 0$.</p>
Teaching methods	The course includes interactive lectures and exercises. The emphasis is on critical understanding of the theory and active problem solving.
Content	<p>Important concepts and results within the main themes of the course, such as:</p> <ul style="list-style-type: none"> • 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, • Other topics related to the course themes.
Inline resources	https://moodle.uclouvain.be/course/view.php?id=2945
Bibliography	<p>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/).</p>
Other infos	
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Specialization track in Applied Mathematics	FILMAP	5		
Mineure Polytechnique	MINPOLY	5		