UCLouvain

lmat1322

2024

Real and harmonic analysis

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Ponce Augusto ;
Language :	French > English-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	It is recommended that the student be familiar with the basic concepts of real analysis as developed in LMAT1122 and be familiar with or in the process of becoming familiar with notions of integration in Euclidean spaces as developed in LMAT1221. Some familiarity with the language of functional analysis as developed in LMAT1321 may be helpful, but is not essential.
Main themes	The course covers the basics of measurement theory and Fourier analysis.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 At the end of this activity, students will be able to : • define mathematically the fundamental objects of the course, • state and prove the course's propositions and theorems, • illustrate definitions, propositions and theorems with examples, counter-examples and applications, • apply demonstration methods learned in the course to similar situations. Students will have progressed in their ability to : • identify the unifying aspects of different situations and experiences, • reason within the framework of the axiomatic method, • construct and write a demonstration independently, clearly and rigorously.
Evaluation methods	The assessment will take the form of a **continuous assessment**, based on mandatory assignments to be submitted throughout the term. Participation in lectures is **mandatory**. In the event of a second registration for the exam, the assessment will take the form of a written exam covering the entire subject.
Teaching methods	The learning activities consist of lectures and practical sessions. The lectures aim to introduce the fundamental concepts, to motivate them by showing examples and establishing results, to show their reciprocal links and their links with other courses in the Bachelor of Mathematical Sciences program. The practical sessions aim at deepening the concepts discussed in the lecture.
Content	The course will cover elements of real analysis and harmonic analysis in Euclidean space: • Kurzweil-Henstock integral, • Fundamental Theorem of Calculus, • Lebesgue's differentiation theorem, • convolution product, • Fourier transform.
Inline resources	Additional documents on Moodle.
Bibliography	Le cours sera basé sur des extraits des références suivantes : • A. Ponce et J. Van Schaftingen. LMAT1121 - Analyse mathématique 1, DUC, Louvain-la-Neuve, 2016 • A. Ponce et J. Van Schaftingen. LMAT1221 - Analyse mathématique 3, DUC, Louvain-la-Neuve, 2016 • A. Ponce. Elliptic PDEs, measures and capacities, EMS Tracts Math. 23, European Mathematical Society (EMS), Zürich, 2016 • P. Mironescu. Mesure et intégration. Polycopié parcours L3 math, Université Claude Bernard, Lyon, 2020
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Additionnal module in Mathematics	APPMATH	5		🔍
Bachelor in Mathematics	MATH1BA	5		🔍