UCLouvain

lmat1322

2023

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	Skill acquisition will be assessed in a final exam. Questions will require : • render material, including definitions, theorems, proofs, examples, • select and apply methods from the course to solve problems and exercises • adapt methods of demonstration from the course to new situations, • synthesize and compare objects and concepts. Assessment will include : • the knowledge, understanding and application of the various mathematical objects and methods of the course, • the rigor of the developments, proofs and justifications, • the quality of the writing of the answers.
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 the abstract theory of measure and harmonic anaylsis elements in Euclidean space : • Fréchet measure and integral, • decompositions of measures, • integral convergence theorems, • Lebesgue differentiation theorem, • product measure and theorems of Fubini and Tonelli, • change of variables theorem, • convolution product, • series and Fourier transform.
Inline resources	Additional documents on Moodle.

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		🔍