UCLouvain

lmat2410

2023

Partial differential equation : heat equation, brownian moves and numerical aspects

5.00 credits	30.0 h + 15.0 h	Q2

This learning unit is not being organized during this academic year.

Language :	French > English-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Students are expected to have followed an introduction to functional analysis or partial differential equations such as : LMAT1321 - Functional Analysis and Partial Differential Equations, or LINMA1315 - Complements of Analysis, or LMAT2130 - Partial Differential Equations 1: Poisson and Laplace Equations
Main themes	Study of partial differential equation based on methods from real analysis, harmonic analysis, functional analysis and measure theory. The goal is to establish the existence, uniqueness and qualitative properties of solutions.
Learning outcomes	**At the end of this learning unit, the student is able to :** Contribution of the course to the learning outcomes of the Master's programme in mathematics. **At the end of this activity, the student will have progressed in :** (a) The ability to acquire independently and exploit new knowledge and skills throughout their professional life (b) The capacity for abstraction, reasoning and critical thinking. **He/she will be able to :** i. Identify the unifying aspects of different situations and experiences. ii. Reason within the framework of the axiomatic method. iii. Construct and write a proof in an autonomous, clear and rigorous way. (c) Scientific communication skills. **He/she will be able to :** i. Write a mathematical text according to the conventions of the discipline. ii. Structure an oral presentation by adapting it to the level of expertise of the interlocutors. (d) The ability to identify, through the abstract and experimental approach specific to the exact sciences, the unifying aspects of different situations and experiments in mathematics or related fields. (e) The capacity for abstraction and critical thinking, with the aim of becoming able to i. Reason within the framework of the axiomatic method. 1 ii. Recognise the key arguments and structure of a demonstration. iii. Construct and write a demonstration independently. iv. Appreciate the rigour of a mathematical or logical argument and identify possible flaws. v. Distinguish between intuition about the validity of a result and different levels of rigorous understanding of the same result. (f) Clarity, precision and rigour in communication activities with the aim of becoming able to i. Write a mathematical text according to the conventions of the discipline. (g) The ability to learn independently. **He/she will be able to :** i. Search for sources in the mathematical literature and judge their relevance. ii. correctly situate an advanced mathematical text in relation to the knowledge acquired. Course specific learning outcomes. **At the end of this activity, the student will be able to :** --- present modelling contexts that show the problems studied in the course. - To answer mathematically questions concerning the properties of solutions of partial differential equations (existence, uniqueness, qualitative properties). - Apply and present techniques of real analysis, harmonic analysis, functional analysis and measure theory to the study of partial differential equations. - Interpret the results of the course in different modelling contexts.

Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mathematical Engineering	MAP2M	5		