UCLouvain

lmat2925

2026

Advanced topics in mathematics 6

5.00 credits	30.0 h	Q2

This biannual learning is being organized in 2026-2027

Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Depending on the subject, mathematics skills at the level of the end of the Bachelor in Mathematics or first year Master in Mathematics.
Main themes	The topic considered varies from year to year depending on the research interests of the course instructor.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 Contribution of the course to learning outcomes in the Master in Mathematics programme. By the end of this activity, students will have made progress in: • Show evidence of independent learning. • Analyse a mathematical problem and suggest appropriate tools for studying it in depth. • Begin a research project thanks to a deeper knowledge of one or more fields and their problematic issues in current mathematics. He will have made progress in: • Develop in an independent way his mathematical intuition by anticipating the expected results (formulating conjectures) and by verifying their consistency with already existing results. • Ask relevant and lucid questions on an advanced mathematical topic in an independent manner. Learning outcomes specific to the course. The course aims to initiate research in the field under consideration. Specific learning outcomes vary depending on the field.
Evaluation methods	Assessment may take different forms, to be established by the teacher at the beginning of the course. It may be based on any possible presentations by students during the course, but it may also be supplemented by a piece of work to be submitted after the end of the course or by a more traditional oral examination. In the case of work to be submitted or of an oral examination, students may choose the language (English or French).
Teaching methods	The course is taught through lectures. During sessions, students may be asked to give their contribution in the form of questions or of presentations of parts of the course as previously established by the teacher.
Content	The course will provide an introduction to the Categorical Galois Theory of George Janelidze. The following topics will be covered during the course: • Galois extensions and Galois correspondence (reminders) • Grothendieck's Galois Theory : separable algebras and profinite spaces • Galois Theory of commutative rings • Descent Theory • Galois structures and Galois groupoids • Examples : coverings of spaces, abstract families, central extensions • Commutator Theory and Hopf formulae
Inline resources	MoodleUCLouvain
Bibliography	• F. Borceux, *Galois Theories of Fields and Rings,* Coimbra Mathematical Texts (2024) • F. Borceux and G. Janelidze, *Galois theories*. Cambridge University Press (2001)
Other infos	The course will assume a basic knowledge of Category Theory (LMAT2150 or equivalent). Some familiarity with Galois Theory (LMAT1361 ou equivalent)is also preferable.
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mathematics	MATH2M	5		🔍