lmat2210
2017

Algebra

6 credits	45.0 h	Q1

Teacher(s)	Tignol Jean-Pierre ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	The course surveys topics of current interest in algebra, to be determined as far as possible in consultation with the potential audience. In 2015'2016, the theme will be the theory of affine group schemes.
Aims	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: - mastering the disciplinary knowledge and basic transferable skills whose acquisition began in the Bachelor programme They will have expanded their basic disciplinary knowledge and skills, notably in -- recognizing the fundamental concepts of important current mathematical theories ; -- establishing the main connections between these theories, analysing them and explaining them through the use of examples. - showing evidence of abstract thinking and of a critical spirit : -- recognizing the fundamental concepts of important current mathematical theories ; -- identifying the unifying aspects of different situations and experiences ; -- arguing within the context of the axiomatic method ; -- constructing and drawing up a proof independently, clearly, and rigorously. - beginning a research project thanks to a deeper knowledge of one or more fields and their problematic issues in current mathematics. This knowledge aims at allowing the students to interact with other researchers in the context of a research project at doctoral level. Learning outcomes specific to the course. By the end of this activity, students will be able to: - recognize linear algebraic groups under various presentations and use their structure theory to determine their properties ; - decompose linear algebraic groups into connected components ; - classify groups of multiplicative type ; - compute the Lie algebra of a linear algebraic group and determine whether the group is smooth ; - use descent theory to derive exact sequences of cohomology groups and use it to classify various algebraic objects. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*

Evaluation methods	Assessment is by oral examination. This tests knowledge and understanding of concepts, examples and fundamental results, ability to construct a coherent argument, and ability to master the techniques of proof introduced in the course.
Teaching methods	The course is taught through lectures, which include a certain amount of exercises and practical work. Particular attention is given during the course to discussion of solutions to exercises following students' suggestions.
Content	The aim of the course is to provide tools for starting an original research project on a topic in algebra. The following material will be discussed in the course of the lectures : - Affine group schemes and algebraic matrix groups. - Representations. - Connected components. - Groups of multiplicative type. - Unipotent, nilpotent, and solvable groups. - Lie algebras. - Construction of quotients. - Descent theory.
Inline resources	Website iCampus (http://icampus.uclouvain.be/).

Bibliography	B. Kahn: Formes quadratiques sur un corps, Cours spécialisés 15, Soc. Math. France, Paris, 2008. T.Y. Lam: Introduction to quadratic forms over fields, Amer. Math. Soc., Providence, RI, 2005.
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Mathematics	MATH2M	6		🔍