UCL Université catholique de Louvain

LMAT2420

2014-2015

Combinatorial geometry

5.0 credits	30.0 h + 15.0 h	1q

Teacher(s) :	Claeys Tom ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	Site on Moddle
Prerequisites :	LMAT1222 - Complex Analysis 1 (second year of bachelor in mathematical sciences) or equivalent course
Main themes :	Reminders of complex analysis, conformal mappings, Möbius transformations, Riemann mapping theorem, asymptotic methods (Laplace method, steepest descent method), special functions
Aims :	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: - Recognise and understand a basic foundation of mathematics. In particular: -- Recognise the fundamental concepts of important current mathematical theories. -- Establish the main connections between these theories. - Show evidence of abstract thinking and of a critical spirit. In particular: -- Identify the unifying features of different situations and experiments in mathematics or in closely related fields (probabilty and statistics, physics). -- Argue within the context of the axiomatic method. -- Construct and draw up a proof independently, with clarity and rigour. Learning outcomes specific to the course. By the end of this activity, students will be able to: (a) Understand and apply the major results from complex analysis. (b) Understand the theory of conformal mappings and Möbius transformations. (c) Construct bijective conformal mappings between simple domains. (d) Understand and use several asymptotic methods. The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the program(s) can be accessed at the end of this sheet, in the section entitled 'Programmes/courses offering this Teaching Unit'. *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 :	The evaluation will be based on an oral exam and on a project done by the student during the year. At the exam, knowledge and understanding of different notions, methods and results seen in the course will be tested.
Teaching methods :	The course consist of lectures with active participation by the students, and of exercise classes, during witch students will work on exercises directly related to the course material.
Content :	The following contents will be studied. (a) reminder of important results in complex analysis ans some complements (evaluation of infinite sums by residue theorem, open mapping theorem,...) (b) conformal mappings: general theory, Möbius transformations, Riemann mapping theorem. (c) asymptotic methods: asymptotic series, Laplace method, steepest descend method, Stirling's formula, special functions. (d) complex analysis ans asymptotic methods in modern mathematical research.
Bibliography :	- J.B. Conway, Functions of one complex variable. - J.E. Marsden and M.J Hofman, Basic complex
Other infos :	Cycle and year of program MATH2M - Tronc commun de Master 120 en sciences mathématiques MATH2M1 - Cours au choix du Master 60 en sciences mathématiques
Cycle and year of study :	> Master [120] in Mathematics

Faculty or entity in charge:	MATH