UCLouvain

lmat2420

2024

Complex analysis

5.00 credits	30.0 h + 15.0 h	Q2

Teacher(s)	Claeys Tom ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	LMAT1222 - Complex Analysis 1 (second year of bachelor in mathematical sciences) or equivalent course
Main themes	Reminders of complex analysis, conformal applications, homographic transformations, Riemann conformal application theorem, asymptotic methods (Laplace method, collar method), special functions.
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 his/her ability to :** (a) Know and understand a basic foundation of mathematics. In particular, they will have developed the ability to: i. Recognise the fundamental concepts of important current mathematical theories. ii. Establish the main links between these theories. (b) Demonstrate abstraction, reasoning and critical thinking skills. In particular, they will have developed the ability to : 1 i. Identify unifying aspects of different situations and experiences. ii. Reason within the framework of the axiomatic method. iii. Construct and write a demonstration in an autonomous, clear and rigorous way. Course-specific learning outcomes. **At the end of this activity, the student will be able to :** (a) Understand and use the main results of complex analysis. (b) Understand the theory of conformal applications and homographic transformations. (c) Construct conformal and bijective applications between simple regions. (d) understand and use several asymptotic methods.
Evaluation methods	The assessment is based on an oral examination and a project done by the student during the term. In the examination, the knowledge and understanding of the concepts, methods and results seen in the course are tested.
Teaching methods	The course is given in the form of lectures with active participation by the students. During the practical sessions, students work on exercises directly related to the course material.
Content	The following contents are covered in the course. (a) reminders of important results in complex analysis and some complements (evaluation of infinite sums by the residue theorem, open image theorem, ...). (b) conformal applications: general theory, homographic transformations, Riemann conformal application theorem. (c) asymptotic methods: asymptotic series, Laplace method, collar method, Stirling formula, special functions. (d) complex analysis and asymptotic methods in current mathematical research.
Bibliography	• J.B. Conway, Functions of one complex variable. • J.E. Marsden and M.J. Hofman, Basic complex analysis, third edition.
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [60] in Physics	PHYS2M1	5		🔍
Master [120] in Mathematics	MATH2M	5		🔍
Master [60] in Mathematics	MATH2M1	5		🔍
Master [120] in Physics	PHYS2M	5		🔍