UCLouvain

lmat1222z

2017

Complex analysis 1

5 credits	30.0 h + 15.0 h	Q2

Teacher(s)	Haine Luc ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Power series, analytic functions, holomorphic functions, Cauchy integral, Taylor expansion, isolated singular points, Laurent expansions, residue calculus.
Aims	*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 based on a written examination that focuses on theory and on exercises in more or less equal parts. The examination tests knowledge and understanding of fundamental concepts and results, ability to construct and write a coherent argument, to give examples and counter-examples, and mastery of the techniques of calculation. Active participation in exercise sessions may supply a bonus of a maximum of 2 points which are added to the final grade.
Teaching methods	Learning activities consist of lectures and exercise sessions. The lectures aim to introduce fundamental concepts, to explain them by showing examples and by determining their results, to show their reciprocal connections and their connections with other courses in the programme for the Bachelor in Mathematics. The exercise sessions focus on constructing proofs, examining numerous examples and counter-examples, and mastering methods of calculation.
Content	Complex analysis is a central subject in mathematics, which possesses many applications in Engineering and Physics. The course deals with the study of the basic methods in the theory of analytic functions of one complex variable. It also aims at developing a geometric intuition of the subject and discusses several applications. The following subjects are treated in the course. - Series: numerical series and series of functions. - Power series and analytic functions: radius of convergence of a power series, notion of an analytic function, identity theorem, principle of the isolated zeros, principle of analytic continuation. - Holomorphic functions: definition and properties, Cauchy-Riemann equations, holomorphic character of analytic functions, integration along a path, Cauchy integral formula and analytic character of holomorphic functions, Liouville theorem, theorem of d'Alembert-Gauss, principle of the maximum modulus, Schwarz lemma. - Laurent series, isolated singular points: homotopy of paths and integration of holomorphic functions, holomorphic functions in an annulus and Laurent series, isolated singular points (poles and essential singularities), Riemann apparent singularity theorem, notion of a meromorphic function, Casorati-Weierstrass theorem. - Residue theorem and applications: problem of primitives and complex logarithm, residue theorem, calculation of integrals by the method of residues, argument principle, Rouché theorem, residue at infinity.
Inline resources	The iCampus website (http://icampus.uclouvain.be/) provides the syllabus of the course with bibliographical references as well as all problem sets for the exercise sessions.
Bibliography	Syllabus disponible sur iCampus avec références bibliographiques.
Faculty or entity in charge	SC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Minor in Mathematics	LMATH100I	5		🔍