UCLouvain

lmat1343

2020

Algebraic curves

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 15.0 h	Q1

Teacher(s)	Haine Luc ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Elliptic functions of Weierstrass and Jacobi, associated elliptic curves, Abel's theorem, addition theorem, selected applications in geometry, mechanics and number theory.
Aims	1 Contribution of the course to learning outcomes in the Bachelor in Mathematics programme. By the end of this activity, students will have made progress in: - Recognise and undertsand a basic foundation of mathematics. In particular: -- Choose and use the basic tools of calculation to solve mathematical problems. -- Recognise the fundamental concepts of important current mathematical theories. -- Establish the main connections between these theories, analyse them and explain them through the use of examples. - Identify, by use of the abstract and experimental approach specific to the exact sciences, the unifying features of different situations and experiments in mathematics or in closely related fields. - Show evidence of abstract thinking and of critical spirit. In particular; -- Argue within the context of the axiomatic method. -- Recognise the key arguments and the structure of a proof. -- Construct and draw a proof independently. -- Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it. - Be clear, precise and rigorous in communicating. -- Write a mathematical text in French according to the conventions of the discipline. -- Structure an oral presentation in French, highlight key elements, identify techniques and concepts and adapt the presentation to the listeners' level of understanding. Learning outcomes specific to the course. By the end of this activity, students will be able to: - Construct holomorphic and meromorphic functions in terms of infinite series or products. - Apply Abel's theorem and the addition theorem of elliptic functions theory in various contexts. - Solve problems which use elliptic functions and elliptic curves. - - - - *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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Final oral exam (Teams) on the theory and the exercises in equal parts. The exercises will be chosen from the list of problems given at the start of the class, that the students must solve regularly during the quadrimester.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Learning activities consist of lectures which aim to introduce fundamental concepts, to explain them by showing examples and by proving theorems. Students are assigned problems at the begining of the course, that they must solve regularly during the quadrimester to prepare themselves for the final exam.
Content	In 2020-2021, we will study compact Riemann surfaces and their link with algebraic curves. Riemann was the first to understand that algebraic functions like "square root of z" are well defined and meromorphic on a branched covering of the complex plane with a point added at infinity. The concept was clarified only fifty years later by Hermann Weyl who introduced the notion of an abstract variety. We shall study the following topics: 1. Abstract Riemann surfaces. 2. Covering spaces. 3. Construction of the Riemann surface of an algebraic function, determination of the genus.
Inline resources	The Moodle website provides copies of the two references used for the course as well as the problem sets to be done during the quadrimester.

Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Additionnal module in Mathematics	APPMATH	5		