UCLouvain

lmat1141

2024

Geometry I

7.00 credits	45.0 h + 30.0 h	Q2

Teacher(s)	Lambrechts Pascal ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	LMAT1121 - mathematical analysis 1 (or equivalent course). LMAT1131 - linear algebra (or equivalent course).
Main themes	Euclidean geometry : affine and euclidean space, quadrics . Differential geometry : plane and skew curves ; local theory of surfaces in 3-dimensional space.
Learning outcomes	**At the end of this learning unit, the student is able to :** 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 understand a basic foundation of mathematics. --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 (probability and statistics, physics, computing). - show evidence of abstract thinking and of a critical spirit. Argue within the context of the axiomatic method Recognise the key arguments and the structure of a proof. Construct and draw up a proof independently. Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it. Distinguish between the intuition and the validity of a result and the different levels of rigorous understanding of this same result. Learning outcomes specific to the course. By the end of this activity, students will be able to : - Determine loci in affine and euclidean spaces and represent them graphically - Determine and characterize affine maps and isometries. - Classify quadrics, especially in dimension 2 and 3. Determine their geometric invariants : adapted frame, asymptotic directions and use them to represent graphically the quadric. - Compute and interpret differential invariants of a curve as tangent vector, curvature vector, Frenet frame, length of a curve. - Compute and interpret differential invariants of a surface as tangent plane, fundamental form, normal, principal and total curvature, area of a surface.
Evaluation methods	The evaluation is done by a written exam, possibly completed by an oral exam if the grade of the written exam is sufficient. One or more written tests may be offered during the course. These tests are optional but their grade may contribute as a bonus to the written exam.
Teaching methods	The learning activities consist of lectures and practical sessions, in person.
Content	The course will be composed of two parts. The first part, based on linear algebra methods, will deal with affine and Euclidean geometries, the classification of isometries in low dimension and the classification of quadrics. The second part, using more analytical tools, will give the basic elements of the local theory of curves and surfaces.
Inline resources	https://moodle.uclouvain.be/enrol/index.php?id=3064

Bibliography	Syllabus disponible sur moodle avec références bibliographiques. --- Syllabus available on moodle with bibliographic references.
Faculty or entity in charge	SC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Minor in Mathematics	MINMATH	7		🔍
Bachelor in Mathematics	MATH1BA	7		🔍
Bachelor in Physics	PHYS1BA	7		🔍