UCLouvain

lmat1323

2021

Topology

5.00 credits	30.0 h + 15.0 h	Q1

Teacher(s)	Dos Santos Santana Forte Vaz Pedro ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	Course LMAT1121 Mathematical Analysis 1, or equivalent course, Mastery of the French language. *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.*
Main themes	Metric spaces, topological spaces, topological structures, Hausdorff spaces, compactness, connectedness, the language of neighborhoods.
Learning outcomes	**At the end of this learning unit, the student is able to :** **Contribution of the course to the learning outcomes of the bachelor's degree program in mathematics.** **At the end of this activity, the student will have progressed in his/her ability to :** - Know and understand a fundamental foundation of mathematics. In particular, he/she will have developed the ability to: -- Select and use fundamental methods and tools of topology to solve mathematical problems, in algebra, analysis or geometry. -- Understand the foundations of the theory, know how to explain them and motivate them with examples. - To be able to concretize an intuitive approach into a more general, rigorous and exact formalization. - Demonstrate abstraction and critical thinking. He will have developed his ability to : -- Combine intuition and geometric vision with formalization. -- Recognize the key arguments and the structure of a demonstration. 1 -- Construct a reasoning in an autonomous way. -- Appreciate the rigor of a mathematical reasoning and detect possible flaws. **Specific learning outcomes of the course.** **At the end of this activity, the student will be able to :** - Use the basic tools of general topology in important uses in commutative algebra, geometry and functional analysis. - Use basic theorems and understand their scope and interest. - Exploit the properties of topology to describe concrete geometric spaces or more abstract spaces. - Know how to use the concepts of topology to solve specific problems. The contribution of this course to the development and mastery of the skills and knowledge of the program(s) is available at the end of this document, in the section "Programs/training courses offering this course".
Evaluation methods	Assessment is based on a written examination with three parts of equal value: one part checking acquisition of the subject taught; one part requiring more thought to show that the student has been able to put the subject into perspective and has in part absorbed it; and a third part consisting of exercises in the same style as those performed throughout the year. The evaluation system may be adapted if the sanitary situation change.
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. Only results whose proofs are not hyper-technical are demonstrated in the course. Results are often presented with historical commentary and with applications. Exercise sessions aim at assimilating theory by means of calculation exercises and exercises in thinking. The teacher and exercise assistant have informed students of the office hours during which they are available for further explanation.
Content	This activity consists in introducing the basic concepts of topology which have an essential role in the whole curriculum of bachelor's and master's degrees in mathematical and physical sciences **The following content is covered in the course :** 1. Definition and example of metric spaces: continuous functions, open and closed sets in metric spaces.

	2. Definition and example of topological spaces: continuous functions, open and closed sets in topological spaces. Interior and closure. 3. More on topological structures: homeomorphisms, topological subspaces, product of topological spaces and quotient topology. 4. Separability: Hausdorff spaces. 5. Compactness: compact spaces, products of compact spaces, compactness in metric spaces. 6. Connectedness: related and arc related spaces. 7. Neighborhoods and bases of a topology. 8. Homotopy and degree
Inline resources	Course web page in moodle Texts given during the lectures, list of exercises, questions of the previous exams (with aims and solutions)
Bibliography	Syllabus distribué au cours ---- Syllabus distributed during the course
Faculty or entity in charge	MATH

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Minor in Mathematics	MINMATH	4		🔍
Bachelor in Mathematics	MATH1BA	5	LMAT1122	🔍
Additionnal module in Mathematics	APPMATH	5		🔍