

5.00 credits

30.0 h + 15.0 h



Q1


This biannual learning unit is not being organized in 2023-2024 !

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| Language : | English |
| Place of the course | Louvain-la-Neuve |
| Prerequisites | LMAT1131 - linear algebra (first year Bachelor of Mathematical Sciences) or equivalent course. LMAT1231 - multilinear algebra and group theory (second year Bachelor of Mathematical Sciences) or equivalent course. LMAT1323 - topology (Second Year B.Sc. Mathematics) or equivalent course. |
| Main themes | Classification of surfaces. Euler's characteristic. Fundamental group. Coating. Homology. |
| Learning outcomes | <p>At the end of this learning unit, the student is able to :</p> <p>Contribution of the course to the learning outcomes of the master's program in mathematics.</p> <p>At the end of this activity, the student will have progressed in his/her ability to :</p> <ul style="list-style-type: none"> - Acquire independently and exploit new knowledge - Demonstrate abstraction, reasoning and critical thinking skills. In particular, they will have developed their ability to <ul style="list-style-type: none"> -- read a demonstration and recognize its steps, key arguments and structure -- appreciate the simplicity, the clarity, the rigor, the originality of a demonstration and of a mathematical or logical reasoning and detect possible flaws. - Fundamental disciplinary knowledge and skills, including : <ul style="list-style-type: none"> -- His or her knowledge of the fundamental concepts of important current mathematical theories and will be able to establish the key connections between these theories. -- His/her expertise in fundamental computational tools and their use in mathematical problems. - Scientific communication, especially structuring an oral presentation, highlighting key elements, distinguishing techniques and concepts, and adapting the presentation to the level of expertise of the audience. <p>Course-specific learning outcomes.</p> <p>At the end of this activity, the student will be able to :</p> <ul style="list-style-type: none"> - Recognize, classify and construct surfaces. - Compute on simple examples classical invariants of algebraic topology : fundamental group, Euler class, homology group. - Deduce some topological properties of spaces from invariants of algebraic topology. - Develop in detail an element of algebraic topology theory. |
| Evaluation methods | Evaluation will consist of a written and oral examination after the quadrennium. Assignments may be offered during the year, the grades of which may offer bonuses to the final grade. |
| Teaching methods | Combination of lectures, directed readings, and exercises and presentations to prepare. |
| Content | This activity is a first course in algebraic topology. It is highly recommended to take lmat2215 "homological algebra" in parallel or to have already taken a course in homological algebra. <p>The following contents are covered in this course :</p> <ul style="list-style-type: none"> - Basic notions: homotopy, construction of topological spaces, reminder of varieties, reminder of the classification of surfaces. - Degree of a continuous application of the circle in itself and applications. - Fundamental group: definition and methods of calculation including the Seifert-Van Kampen theorem. Presentation of a group by generators and relations |

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| | <ul style="list-style-type: none"> - Cladding: definitions, examples, links with the fundamental group; universal cladding; raising theorems; classification theorems. - Homology of spaces: definition of simplicial homology and examples of calculations; applications. If time permits, more advanced applications of homology of spaces. |
| Inline resources | Course web page on moodle |
| Bibliography | <p>La bibliographie sera précisée sur la page moodle du cours</p> <p>----</p> <p>The bibliography will be specified on the moodle page of the course</p> |
| Faculty or entity in charge | MATH |

Programmes containing this learning unit (UE)

| Program title | Acronym | Credits | Prerequisite | Learning outcomes |
|-----------------------------|-------------------------|---------|--------------|---|
| Master [120] in Mathematics | MATH2M | 5 | |  |
| Master [60] in Mathematics | MATH2M1 | 5 | |  |