Program	Type of studies (cycle)	Third cycle
	Name of the program	Doctoral Studies in Mathematical and Computer Science

Course

Course title	**Algebraic topology I**

Course code	Semester	Course status	ECTS credits	Contact hours
PMAT 630	I	Elective course	10	30

Aims and intended learning outcomes	Algebraic topology uses algebraic techniques to study topological spaces. The goal is to develop algebraic invariants, such as the fundamental group and (co)homology, that help classify spaces and describe geometric properties preserved under deformation. This course presents the foundations of algebraic topology and introduces applications such as topological data analysis.

Course content/topics

- Homotopy equivalence
- Fundamental group
- Van Kampen theorem
- Covering spaces
- Simplicial complexes
- Chain complexes
- Homology
- Homological algebra
- Categories and functors
- Topological data analysis

LITERATURE

[1] Allen Hatcher, Algebraic Topology, Cambridge University Press, 2002

[2] Tammo Tom Dieck, Algebraic Topology, European Mathematical Society, 2008

[3] James Davis and Paul Kirk, Lecture Notes in Algebraic Topology, American Mathematical Society, 2001

[4] J. Peter May, A Concise Course in Algebraic Topology, University of Chicago Press, 1999

Grading

	Criterion	Points	Cut-off points
1.	Homework	70	40
2.	Final exam	30	15
	Total	100	55