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

COURSE

Course title	**Advanced Topics in Geometry**

Course code	Semester	Course status	ECTS credits	Contact hours
PMAT-702	II	elective	10	30

Aims and intended learning outcomes

The aim of the course is to deepen and systematise students' advanced knowledge of geometry through the study of selected specialised topics aligned with their research interests. Particular emphasis is placed on the development of abstract mathematical thinking, rigorous reasoning, and the theoretical and methodological foundations required for independent research in geometry.

Upon successful completion of the course, students will be able to:

- demonstrate advanced understanding of selected topics in geometry and their underlying theoretical structures;
- critically analyse contemporary mathematical results and relevant research literature;
- formulate and investigate complex mathematical problems independently;
- apply advanced theoretical and methodological approaches to problems in geometry;
- construct rigorous mathematical arguments and critically evaluate the validity and scope of mathematical results;
- independently acquire and integrate specialised knowledge relevant to their research interests;
- communicate and present mathematical results clearly and precisely in accordance with high academic standards.

Course content/topics

- The content of this course is not fixed. In accordance with the students' previously acquired knowledge at lower levels of education and their research interests, the course instructor(s) define a detailed course plan, which is subject to approval by the Study Council.
- Possible thematic units include advanced topics in geometry, such as:
- The development of geometric ideas from Euclidean to modern geometry
- Connections between geometry and other areas of mathematics (topology, combinatorics, algebra)
- Euclidean and projective geometry – a deeper understanding of classical theorems
- Discrete and combinatorial geometry

  as well as other topics in geometry that are the focus of contemporary mathematical research.

LITERATURE

[1] Marcel Berger, Geometry Revealed, Springer Verlag, 2010

[2] Robin Hartshorn, Geometry: Euclid and Beyond, Springer Verlag, 2000

[3] H.S.M. Coxeter, Projective Geometry, Springer-Verlag, 1987

[4] Jiri Matousek, Lectures on Discrete Geometry, Springer-Verlag, 2002

Grading

	Criterion	Points	Cut-off points
1.	Assignments	30	15
2.	Project	40	20
3	Final exam	30	20
	T o t a l	100	55