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

COURSE

Course title	**Toric Varieties**

Course code	Semester	Course status	ECTS credits	Contact hours
PMAT 705	II	elective	10	30

Aims and intended learning outcomes

The aim of the course is to introduce students to the theory of toric varieties as an area connecting algebraic geometry, combinatorics, and convex geometry. Particular emphasis is placed on the combinatorial structure of toric varieties and on the correspondence between algebraic and geometric objects. The course aims to deepen students' knowledge of algebraic geometry while developing techniques that provide insight into the theory of convex polytopes and its connections with toric geometry.

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

- define and explain the fundamental concepts of the theory of toric varieties;
- distinguish between affine and projective toric varieties and describe their basic structures;
- apply standard constructions relating toric varieties to objects from convex geometry, and conversely;
- determine Weil and Cartier divisors on toric varieties;
- distinguish between Weil and Cartier divisors in the setting of normal toric varieties and explain the relationship between these two classes of divisors.

Course content/topics

- Affinie toric varieties and their properties
- Cones and affine toric varieties
- Projective toric varieties and their properties
- Polytopes and projective toric varieties
- Abstract toric varieties and toric morphisms
- Weil and Cartier divisors on toric varieties

LITERATURE

[1] D.A. Cox, J. B. Little, H.K. Schenck, Toric Varieties, AMS, 2011

[2] W. Fulton, Introduction to Toric Varieties, Princeton University Press, 1993

[3] B. Sturmfels, Groebner Bases and Convex Polytopes, AMS, 1995

Grading

	Criterion	Points	Cut-off points
1.	Assignments	50	30
2.	Final exam	50	25
	T o t a l	100	55