MATH-563 **Student seminar in pure mathematics**

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Cursus	Sem.	Type
Ing.-math	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Summary

In this seminar we will study toric varieties, a well studied class of algebraic varieties which is ubiquitous in algebraic geometry, but also relevant in theoretical physics and combinatorics.

Content

- Definition of toric varieties including a reminder on algebraic varieties
- Topology and in particular cohomology of toric varieties
- Applications to polytopes: McMullen's conjecture

Learning Prerequisites

Recommended courses

- Introduction to differentiable manifolds
- Algebraic topology
- Algebraic curves

Learning Outcomes

By the end of the course, the student must be able to:

- Demonstrate their knowledge about toric varieties.

Transversal skills

- Make an oral presentation.
- Write a scientific or technical report.
- Access and evaluate appropriate sources of information.

Teaching methods

Each participant will give a lecture on a subject on toric varieties. The lecture is complemented by the professor and exercise sessions.

Expected student activities

Prepare a lecture, write lecture notes and solutions to exercises. Active participation during class and exercise sessions.

Assessment methods

The grade will depend on the participants oral presentation and written reports. There will be no final exam.

Resources

Bibliography

Toric Varieties by D. Cox, J. Little and H. Schneck

Ressources en bibliothèque

- Toric Varieties / Cox

Moodle Link

- https://go.epfl.ch/MATH-563