MATH-461

Convexity

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

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

Remark

pas donné en 2019-20

Summary

Convexity is fundamental concept in mathematics. This course is an introduction to convexity and its ramifications in high-dimensional Geometry.

Content

- Convex sets, basic notions
- John's Theorem
- Lattices and Minkowski's Theorem
- Dual lattices and transferrence bounds
- The Brunn-Minkowski Inequality
- Measure concentration
- Metric embeddings
- The Johnson-Lindenstrauss Lemma

Keywords

- Convexity
- Polyhedron
- Lattice
- Geometry

Learning Prerequisites

Required courses

Analyjsis 1+2
Linear Algebra 1+2

Recommended courses

Discrete Optimization

Learning Outcomes

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

- Choose an appropriate method for solving a problem in convex geometry
- Prove theorems in convexity
- Design methods to solve problems

Transversal skills

- Demonstrate a capacity for creativity.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.
- Continue to work through difficulties or initial failure to find optimal solutions.

Teaching methods

Ex cathedra lecture, exercises at home and in the classroom.

Expected student activities

Attendance of lectures and exercises
Completion of exercises at home
Study of literature

Assessment methods

Written exam during exam session
Dans le cas de l’art. 3 al. 5 du Règlement de section, l’enseignant décide de la forme de l’examen qu’il communique aux étudiants concernés.

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

Jiri Matousek: Lectures on Discrete Geometry
Alexander Barvinok: A Course in Convexity