MATH-465 **Packing and covering**

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**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Remark

Pas donné en 2018-19

Summary

How many objects of a given shape and size can be packed into a large box of fixed volume? We give a systematic introduction into the rich theory that has grown out of the above questions. Connections to number theory, coding theory, potential theory, and robotics will also be presented.

Content

1. Geometry of numbers
2. Approximation of convex sets by polygons
3. Packing and covering with congruent convex discs
4. Lattice packing and lattice covering
5. The method of cell decomposition
6. Methos of Blichfeldt and Rogers
7. Efficient ramdom arrangements

Keywords

- Packing
- Covering
- Tiling
- Convexity
- Random

Learning Prerequisites

Required courses

- Linear Algebra
- Probability

Recommended courses

Discrete Mathematics of Graph Theory

Learning Outcomes

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

- Analyze the structure economic arrangements of congruent balls and other bodies in the plane and in the space.
- Prove the main theorems in the field.
- Explore how symetric configurations inevitably occur as best solutions of certain problems in geometric optimization.
- Use basic knowledge of constructions and estimates concerning good approximation of plane convex sets by polygons.

Transversal skills

- Use a work methodology appropriate to the task.

Teaching methods

Lectures and exercise sessions

Expected student activities

Solution of homework problems and other assignment

Assessment methods

Oral exam

Supervision

Office hours	Yes
Others	Office hours Tuesday morning

Resources

Bibliography

Pach-Agarwal: Combinatorial Geometry (Wiley)

Websites

- http://opac.nebis.ch/F?local_base=nebis&con_lng=FRE&func=find-b&find_code=020&request=0-471-58890-3