MATH-335 **Coxeter groups**

Lachowska Anna

<table>
<thead>
<tr>
<th>Cursus</th>
<th>Sem.</th>
<th>Type</th>
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<tr>
<th>Language</th>
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<tbody>
<tr>
<td>Credits</td>
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<td>Session</td>
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<td>Exercises</td>
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**Summary**

Study groups generated by reflections

**Content**

- Orthogonal transformations in a real Euclidean space
- Groups generated by reflections. Coxeter groups, root systems. Crystallographic groups. Fundamental regions for Coxeter groups.
- Affine Coxeter groups. Classification.
- Applications and connections with other fields.

**Keywords**

Orthogonal transformations, reflection, regular polytop, root system, simple root, positive root, Coxeter group, Coxeter graph, crystallographic group, fundamental region, symmetric group, simply laced root system, Bruhat order, the longest element of a Coxeter group, Coxeter element, Coxeter plane, Coxeter number, McKay correspondence

**Learning Prerequisites**

**Required courses**

Linear algebra I-II, Group theory

**Recommended courses**

Linear algebra I-II, Geometry I-II, Group theory, Lie algebras, Linear representations of finite groups

**Learning Outcomes**

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

- Apply concepts and ideas of the course
- Reason rigorously using the notions of the course
- Choose an appropriate method to solve problems
- Identify the concepts relevant to each problem
- Apply known methods to solve problems similar to the examples shown in the course and in the problem sets
- Solve new problems using the ideas of the course
- Implement appropriate methods to identify and study the groups generated by reflections

**Teaching methods**
Lectures and exercise sessions

Assessment methods

Written exam
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 No
Assistant Yes
Forum No

Resources

Bibliography

Ressources en bibliothèque

• Reflection Groups and Coxeter Groups / Humphreys
• Finite Reflection Groups / Benson & Grove
• (electronic version)
• Combinatorics of coxeter groups / Björner & Brenti