250130-1 VO Topics in Algebra: Coxeter Groups (2022S)

ECTS: 5.00 SWS: 3.00

Coxeter groups are abstract reflection groups. They have connections to many areas of mathematics: symmetries of regular polytopes, classification of simple Lie algebras, regular tessellations of the Euclidean and hyperbolic planes, manifold topology, and various other topics in algebra, combinatorics, topology, and geometric group theory. We'll survey some of these classical results. In the second half of the course we will focus on current research into the large-scale geometry of Coxeter groups, particularly in the "right-angled" case.

Course topics:

* Survey of geometric reflection groups.

* Abstract reflection groups and the combinatorial group theory of Coxeter groups.

* Introduction to geometric group theory and construction of the Davis complex for Coxeter groups.

* How cube complexes are better than polyhedral complexes and applications to modern results in right-angled Coxeter groups.

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Meetings: M 9:00-9:45 in SR11, W 8:00-9:30 in SR12

Mode: This is planned to be an in-person class, following applicable University guidelines on Covid19 prevention. If the University cancels in-person meetings we will switch to synchronous online presentation on Zoom, which will be available through the Moodle page. There will not be livestreaming of the lectures by default, but this can be reconsidered if conditions demand.

Text: I will post notes as the semester progresses. Find them through moodle or on my webpage:

https://www.mat.univie.ac.at/~cashen/Notes_on_Coxeter_groups.pdf

Further resources:

- *The geometry and topology of Coxeter groups* by Mike Davis (free download)
- *The large-scale geometry of right-angled Coxeter groups,* (a survey of recent results on right-angled Coxeter groups) by Pallavi Dani, to appear in Handbook of Group Actions (free download)

Exercises: Exercises will appear in the notes. We will have some discussions about them during the lecture, but there will be no formal submission. I am happy to talk about them if you have any questions.

Exam: The exam will be oral, covering the contents of the lecture.

Disclaimer: Information in this syllabus is subject to change. Changes will be announced via Moodle.