

LTCC Advanced Course

Title: Cohomology of Groups

Basic Details:

- Core Audience: 2/3rd year Pure; (1st year depending on background)
- Course Format: extended

Course Description:

- Keywords: Cohomology of a group, Classifying spaces, Groups acting on trees, Cohomological finiteness conditions

Syllabus: Group cohomology is an area of mathematics relying on a rich interaction between algebra and topology. In this course we will introduce some important concepts in group cohomology using both algebraic and topological methods. In particular, we shall cover:

- Background in homological algebra, Definition of group cohomology via free resolutions
- Topological interpretation, group presentations, the presentation-2-complex, Eilenberg-Mac Lane spaces
- Cohomological finiteness conditions: cohomological dimension, groups of type FP, groups of type F
- Groups acting on trees, HNN-extensions and free products with amalgamation
- If time permits: Cohomology for groups with torsion, classifying spaces for proper actions and their finiteness conditions.

Recommended reading: - K.S. Brown “Cohomology of groups” Springer Graduate Texts in Mathematics 87

Additional reading: R. Geoghegan, “Topological Methods in Group Theory” Springer Graduate Texts in Mathematics 243

Prerequisites: Basic Group Theory, some background in homological algebra helpful but not essential

Format:

- 4 discussion/problem sheets
- Electronic lecture notes (these are strongly encouraged, as they will form the core of the individual study of the students): Summary lecture notes will be provided
- Necessary support facilities: large board
- Proposed timing: Term two
- Lecture/computer session/tutorial/discussion split (hours of each): 10 hours of lectures (problem sheets will be discussed during the lectures)

Lecturer Details:

- Lecturer: Prof. Brita Nucinkis

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