1) Title: Modern topics of geometric group theory.

2) Description: Additionally to the classical topics of geometric group theory such as: presentations by generators and relations, van Kampen diagrams, small cancellation theory, finitness conditions, hyperbolic and automatic groups, the course will touch the following topics:

Growth and cogrowth of finitely generated groups and the use of them in analysis, geometry and probability.

Elementary and non-elementary amenability.

Group actions on rooted trees and dynamics on boundary.

Hopf decomposition for boundary actions.

Spectral theory of groups and Schreier graphs.

Self-similar groups and non-cyclic renormalization.

Formal languages and their use on group theory.

Just-infiniteness and branch groups.

The material presented in the course could be useful to student whose specialization is algebra but also students study the operator algebras, K-theory (around Novikov Conjecture), theory of random walks, coarse geometry, spectral analysis, dynamical systems, computer science. The material will be taken from various books and articles.