Abstracts are below:

Harry Baik
Title: Flows and foliations in 3-manifolds from the viewpoint of group actions on the circle or plane
Abstract: We will first briefly review the basics of (pseudo) Anosov flows and taut foliations in 3-manifolds. In both cases such structures give the fundamental group action on the circle with a transverse pair of invariant laminations. In fact, under some suitable assumptions, one can go back and reconstruct the 3-manifold with flow/foliation from the pair of invariant laminations. Such a construction passes through a so-called bifoliated plane. As a motivating example, we will also discuss the case of surfaces. Surface groups always admit an infinite number of invariant laminations, and these can be used to reconstruct the surface.

Marco Linton
Title: **Coherence, homological coherence and one-relator groups.**
Abstract: **A group G is coherent if all of its finitely generated subgroups are finitely presented, incoherent otherwise. It is relatively easy to come across incoherent groups as most group constructions do not preserve coherence, the direct product of two non-abelian free groups being the prototypical example. On the other hand, many classes of groups of interest to geometric group theorists and low-dimensional topologists turn out to be coherent, such as polycyclic groups, 3-manifold groups, free-by-cyclic groups and one-relator groups. This minicourse will serve as an introduction to the topic of (in)coherence, covering different methods for proving that groups are coherent and leading up to a proof of the coherence of one-relator groups. The first two lectures will focus on topological ideas, covering work of Wise and Louder--Wilton on 2-complexes with negative and non-positive immersions. The next two lectures will focus more on algebraic ideas, focusing on establishing the weaker property of homological coherence by using embeddings of group rings into division rings. The final two lectures will cover upgrading homological coherence to coherence and will conclude by combining the ideas developed throughout the course in order to establish the coherence of one-relator groups.**

Masato Mimura
Title: Invariant quasimorphisms and mixed scl

Abstract: I will present an introductory lecture to theory of invariant quasimorphisms and mixed scl, recently developed in the joint work with Morimichi Kawasaki (Hokkaido U.), Mitsuaki Kimura (Osaka Dental U.), Shuhei Maruyama (Kanazawa U.), and Takahiro Matsushita (Shinshu U.). For a group, a quasimorphism is a function to the real that satisfies the condition of being a group homomorphism up to a uniformly bounded error; the scl (stable commutator length) on the commutator subgroup is defined to be the stabilization of the cl (commutator length). Quasimorphisms and scl are closely related due to the Bavard duality theorem. In my lecture, we extend this framework from a single

group to a pair of a group and its normal subgroup: this amounts to treating a short exact sequence of groups. We will discuss the extendability problem of invariant quasimorphisms, finite dimensionality of the space of non-extendable invariant quasimorphisms under mild conditions, the comparison problem between scl and mixed scl, and some applications.

No background of (ordinary) quasimorphisms or scl is assumed.

Srivatsav Kunnawalkam Elayavalli
Sofic groups and group actions.

This mini course will focus on the idea of soficity, introduced by Gromov and Weiss. I will explain its relevance in group theory and other areas of mathematics such as operator algebras. I will then proceed to define a new notion of soficity for group actions which is based on upcoming joint work with David Gao and Greg Patchell. I will describe salient aspects of this theory, and provide various applications and open questions to investigate.

Santiago Radi

Title: Branch groups

Among the groups acting on trees, branch groups have been being studied in the last twenty-five years as they arise in several areas of mathematics such as automata theory, fractal geometry, dynamical systems, topology, probability or Galois Theory. In my talks, I will introduce the definition of branch groups, we will analyze some examples and discuss some of the known properties. Among the properties, we will see how branch groups play a role in the classification of just-infinite groups, when a branch group is just-infinite and what is the measure of the set of torsion elements. If time permits, I will introduce some of the latest results proved about the closure of regular branch groups, an even more restricted family of branch groups that also has connections with several areas of mathematics.

Rybak, Ekaterina

Title: Isoperimetric inequalities in finitely generated groups.

Abstract: To each finitely generated group G, we associate a quasi-isometric invariant called the Dehn spectrum of G. This is the generalization of the Dehn function to the class of finitely generated, but not necessarily finitely presented groups. The invariant allows us to show that there exist uncountably many pairwise non-quasi-isometric finitely generated groups of finite exponent. We will discuss examples and properties of the Dehn spectrum, its relation to the Dehn function, and key points of the proof of the uncountability of quasi-isometry classes of Burnside groups. The talk is based on the joint work with Denis Osin.

Ashlee Kalauli
Title: Solving the Word Problem for Artin Groups using Garside Structures

Abstract: In 1925 Emil Artin introduced the braid groups, a widely studied class of groups which have applications in many mathematical and non-mathematical fields. These were later generalized to a larger class of groups, now called Artin groups, which have elegant, finite presentations. Despite these nice presentations, the word problem, which seeks to algorithmically determine when two words represent the same group element, has not been solved for most Artin groups. In 2017 Jon McCammond and Robert Sulway showed that Euclidean Artin groups also have a decidable word problem using the dual presentations of Euclidean Artin groups. In this talk, we study the algorithm that solves the word problem in the dual Euclidean Artin group of type A2 using its infinite generating set. We then rework this algorithm to solve the word problem for the Euclidean Arting group of type A2 using its standard, finite generating set.