

**Name:** Takahiro Kitayama

**Research field:** Topology

**Keywords:** 3-manifold, discrete group, character variety, torsion invariant, Morse-Novikov theory

**Current research:**

I am working on 3-manifold topology from aspects of covering spaces, especially, with non-commutative deck transformations. My research is based, in particular, on topological invariants associated to geometric structures or representations of fundamental groups, moduli spaces of linear representations of finitely generated groups, and a certain generalization of the Morse theory for closed 1-forms.

These days I am trying to establish foundations of applying the geometry of moduli spaces of higher-dimensional linear representations to low-dimensional topology. As recent interactive developments between 3-manifold topology and geometric group theory have been remarkable, it is also an important project to extend ideas in the study of 3-manifold groups to that of general discrete groups.

**Prerequisites:**

Topics in seminars will not necessarily be closely related to my research. In accordance with students' interests, various topics concerning topology and the study of discrete groups will be treated. Students are supposed to have well learned basics of the following concepts before entering the master course: manifolds, vector fields, differential forms, homology groups, cohomology groups, fundamental groups, vector bundles. It is recommended to get familiar also with other fields of mathematics.

I hope that through a self-directed and active research students will make solid foundations for their future studies or social activities. When one introduces some contents of literatures in the seminar, he or she should also try to add examples or consider other approaches.