Geometric group theory (L24)

Henry Wilton

The subject of geometric group theory is founded on the observation that the algebraic and algorithmic properties of a discrete group are closely related to the geometric features of the spaces on which the group acts. This course will provide an introduction to the basic ideas of the subject.

We will cover the following topics.

1. Free groups, group presentations and Cayley graphs
2. Group actions and quasi-isometry
3. Amalgams and Bass–Serre theory
4. Fuchsian groups
5. Hyperbolic groups

The books listed below could be used to provide alternative perspectives on some of this material.

Pre-requisites

Part IB Geometry and Part II Algebraic Topology (or equivalents) are required.

Literature

1. M. R. Bridson and A. Haefliger *Metric spaces of non-positive curvature.* Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences], 319. Springer-Verlag, Berlin, 1999. xxii+643 pp.
2. C. Druţu and M. Kapovich, *Geometric group theory.* With an appendix by Bogdan Nica. American Mathematical Society Colloquium Publications, 63. American Mathematical Society, Providence, RI, 2018. xx+819 pp.
3. P. de la Harpe, *Topics in geometric group theory.* Chicago Lectures in Mathematics. University of Chicago Press, Chicago, IL, 2000. vi+310 pp.
4. C. Löh, *Geometric group theory – an introduction.* Universitext. Springer, 2017. xi+389 pp.
5. J. Meier, *Groups, Graphs and Trees: An Introduction to the Geometry of Infinite Groups.* London Mathematical Society Student Texts, 73. Cambridge University Press, Cambridge, 2008. xii+231 pp.

Additional support

Four examples sheets will be provided and four associated examples classes will be given. There will be a one-hour revision class in the Easter Term.