

## BRIEF DESCRIPTION OF THE COURSE

The objective of this course is to take a quick trip through several parts of infinite group theory. Because this is going to be a quick trip some details and proofs will be omitted and therefore can be filled in according to the likes of the audience. I hope to cover bits and pieces of the following topics:

- Automatic and hyperbolic groups.
- Nilpotent and Solvable groups
- Decomposition theorems.
- Embedding theorems.
- Algorithms involving finitely presented groups.
- Growth functions in groups.
- Quasi-isometries

## PREREQUISITES AND REFERENCES

A basic course in algebra, definitions of a group, subgroup, normal subgroup, the isomorphism theorems, permutation groups, definition of a free group, definition of a presentation, basics of the fundamental group (will be useful, but not required). Some references for reading about these topics are the following:

- “The theory of groups,” Volumes I, II, by A.G. Kurosh.
- “Combinatorial group theory,” by Magnus, Karrass and Solitar.
- “An introduction to the theory of groups,” by Rotman.
- “Algebraic Topology,” by Hatcher (Chapter 1). Available at:  
<http://www.math.cornell.edu/~hatcher/AT/ATpage.html>

The volumes by Kurosh and the book of Hatcher are the most easily accessible of these books.

## REFERENCES

There will be no official text for the class, but below is a list of some relevant books. Each of these books touches on some aspect of what we will discuss, but contains far more than we could cover in a semester... nonetheless, I encourage people to look through them and see what you may find. Most of these are available online, I will try to also get them available, on hold, for the class in the library.

- M. Kapovich, Lectures on Geometric Group Theory. Download available:  
<http://www.math.ucdavis.edu/~kapovich/EPR/ggt.pdf>
- H. Short (edit.) : MSRI Notes on Hyperbolic groups, (version pdf by public demand) Group Theory from a Geometrical Viewpoint (E. Ghys, A. Haefliger, A. Verjovsky, ed) Proc. ICTP Trieste 1990, WorldScientific, Singapore, 1991, 3–64. Download available:  
<http://www.cmi.univ-mrs.fr/~hamish/Papers/MSRInotes2004.pdf>
- B. Bowditch, A course on geometric group theory. MSJ Mem. Vol 16 (2006). Download available:  
<http://www.warwick.ac.uk/~masgak/papers/bhb-ggtcourse.pdf>
- M. Gromov, Asymptotic invariants of infinite groups. LMS lecture note series vol. 182 (1993).

There are two CUNY GC seminars that often feature talks related to the material we will be covering, these are:

- Magnus Group Theory Seminar  
<http://www.grouptheory.org>
- CUNY Geometry & Topology Seminar  
<http://comet.lehman.cuny.edu/behstock/seminar>