

Course Syllabus

MTH 996, section 003: Topics in Topology – Spring 2009 Geometric and Topological Methods in Group Theory

Classroom: A-117 Wells Hall
Time: TR 1:00 p.m. - 2:30 p.m.
Instructor: Robert W. Bell
Office: A-305 Wells Hall
Office hours: W 2 p.m. - 4 p.m. and by appointment
E-mail: rbell@math.msu.edu
Course web page: <http://www.math.msu.edu/~robertbe/MTH996SP09.html>

Course description: This course is an introduction to geometric group theory. The central theme is to study groups as geometric or topological objects via their actions on nice spaces. The course will begin with a review of the theory of covering spaces.

Topics include Bass-Serre theory, non-positive curvature, and boundaries of groups. The course will conclude with a survey of the literature and fundamental open problems.

Expectations: You are expected to attend class regularly and to participate in discussions. As with any mathematics course, you will benefit most from attempting to solve problems. There will be no collected homework, per se. Instead, each student will be expected to give a presentation during the course. I also strongly recommend that you attend the topology seminar and the 3 & 4 manifolds seminar.

Pre-requisites: The only real pre-requisite is a willingness to learn new mathematics. Realistically, though, you will get a lot more out of the course if you have recently studied covering spaces and fundamental groups. An excellent place to start is Chapter 1 of Allen Hatcher's "Algebraic Topology" which is freely available for download here:
<http://www.math.cornell.edu/hatcher/AT/ATpage.html>

Advice: When you read the statement of a theorem, first try to see if you can prove a special case or even just verify an example or two. Try to think about why the theorem might be false if some of the hypotheses are omitted. Build a library of interesting examples to test your ideas. In some papers, skipping to the examples is more effective than reading the introduction (which is often reads like a personal communication to experts in the field).

If you find that you are falling behind in the course, please stop by during office hours. I can probably provide you with a more concrete problem or idea to think about that captures some of the essence of what is being discussed in class.