MATH 80520, Spring 2023. A. Pillay, MWF 9.30 – 10.45, De Bartolo Hall 242.

Topological dynamics, model theory, and applications.

The official start date of the course is Wednesday, January 18th. But I will be away that week. So the course will actually start on Monday January 23rd.

I will teach 3 days a week, Monday, Wednesday, Friday. The 1 hour 15 minutes allotted period will not be used every lecture. It is just so as to be able to have some extra time to make up for days that I may be absent because of conferences etc.

The aim of the course is to discuss current work and problems around the use of topological dynamical methods in model theory and other areas such as approximate subgroups.

Topological dynamics is about the study of topological groups G via their continuous actions on compact Hausdorff spaces X.

Within model theory, the methods can shed light on 2 kinds of groups, definable groups (considered as discrete groups) and automorphism groups (with the pointwise topology), as well as on related invariants of first order theories.

An approximate subgroup of a group G is a symmetric subset A of G such that A.A is covered by finitely many left translates of A. Topological dynamics methods can help classify or describe approximate subgroups in the absence of invariant measures.

I will try to make the course self-contained although I will circulate or point to various research papers. A useful text for basic topological dynamics is:

Shmuel Glasner, Proximal Flows, Springer Lecture Notes in Math. 517, 1976.

I will assume some knowledge of model theory, such as is contained in the graduate course Basic Logic I and lecture notes on my web-page. But another nice reference is:

Katrin Tent and Martin Ziegler, A course in model theory, CUP, 2012.