COURSE ANNOUNCEMENT

# *PSEUDOFINITE MODEL THEORY*

**MATH 223M, UCLA, FALL 2019**

**MWF 10-10:50AM, MS 7608**

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**Description.** First order model theory of infinite structures is a well–developed field of mathematics with powerful methods and results studying the interaction between mathematical structures such as groups, fields, graphs, and the formal languages used to describe them. On the other hand, model theory of finite structures has close connections to computer science. Ultraproducts of finite structures, or more generally *pseudofinite structures*, provide a bridge between the two worlds. In this course we will discuss model theory of pseudo-finite structures, based around various notions of measure and dimension on definable sets in the limit stemming in the infinite limit from counting on finite structures, and their interaction with various model-theoretic notions of tameness (stability, NIP, etc). We will also consider some applications to combinatorics of graphs and groups.

Topics will include some subset of the following, depending on our progress:

- Hrushovski's $\delta$-dimension and its applications (Larsen-Pink/Hrushovski-Wagner, Erdős-Hajnal for stable graphs, Shelah's two-cardinal theorem a la Hrushovski, hypergraph containers method, etc.)
- Matroids arising from strongly minimal pseudofinite structures are "vector space"-like (or: MS-measurable stable structures are one-based); coherent pregeometries.
- Pseudofinite group configuration.
- Higher order amalgamation in pseudofinite structures.