MATH 5710 - TOPICS IN LOGIC

Instructor: Aaron Anderson **Email:** awanders@sas.upenn.edu
Office: DRL 3N8E **Course website** `awainverse.github.io/teaching`

Schedule: This class meets Tθ 3:30-5 in a location TBA.

Office Hours:
Two hours weekly to be determined, and by appointment.

Topics: We will cover a variety of topics in model theory, highlighting connections to combinatorics and algebra. We will start with an exploration of quantifier elimination in a number of classic theories. We will then dive deeper into the model theory of real closed fields (such as $\mathbb{R}$) in particular, generalizing to o-minimal structures, covering properties such as o-minimal cell decomposition. There are then several topics which we can pursue, depending on time and interest, such as

- Pregeometries/matroids/dimension in strongly minimal and o-minimal structures
- Semialgebraic incidence combinatorics and distal cell decompositions
- NIP, VC-dimension and connections with statistical learning theory.

Grading: Students will be graded either on presentations or homework. Provided the size of the class allows, I will allow students to choose their grading method early in the semester.

Presentations: One 45-minute in-class seminar presentation will suffice to meet the presentation requirement.
Presentations can be on any relevant research paper or similar topic with instructor approval. Here is a preliminary list of recommended papers, which will grow:

- Neer Bhardwaj and Lou van den Dries. On the Pila–Wilkie theorem. *Expositiones Mathematicae*, 40(3):495–542, 2022
- Artem Chernikov, David Galvin, and Sergei Starchenko. Cutting lemma and zarankiewicz's problem in distal structures. *Selecta Mathematica*, 26(2):25, 2020

Homework: Homework will be offered on a biweekly basis.