

SELECTED TOPICS IN MODEL THEORY

Prerequisites: obviously, some background in mathematical logic (as, e.g., from an Introduction to Mathematical Logic), is indispensable for this seminar; more specifically, an interest in and/or ideally some acquaintance with some specific themes in model theory is advisable, especially for MSc level topics. Depending on participants' interests and background we may explore specific directions towards classical themes in the study of expressiveness of logics and connections with universal algebra and combinatorial issues salient also in the model theory of finite structures.

Devoted to a bunch of selected separate topics, the seminar should allow participants to choose and prepare a topic following individual preferences. The following is a preliminary collection of suggested thematic clusters.

- back&forth games in the analysis of expressiveness, Ehrenfeucht–Fraïssé and Karp theorems, partial isomorphy and variations for non-classical logics
- Lindström theorems for FO and for interesting fragments of FO, based on, e.g. a paper by van Benthem, ten Cate and Väänänen (classical model theory for logics other than FO) among others
- extension properties for partial automorphisms in the finite: universal algebra of local vs. global symmetries, possibly (as an advanced topic) connections to group and semigroup theory, based on papers by Herwig–Lascar, Hubicka–Konecny–Nesetril among others
- classical methods in non-classical settings, based on papers by Dittmann, Lindell–Towsner–Weinstein and Tsuboi
- the Keisler–Shelah theorem on isomorphic ultrapowers (involving some infinitary set-theoretic combinatorics, otherwise ‘pure’ classical model theory)
- expressive completeness results for fragments of FO in classical and possibly finite model theory, e.g. for positive existential FO for homomorphism preservation, based on Rossman’s paper

A first meeting for organisational purposes will be scheduled around the start of the teaching term. You are also encouraged to contact me directly by email to discuss interests and possible topics beforehand: otto@mathematik.tu-darmstadt.de