Mini-courses

I. Continuous model theory, Bradd Hart (McMaster University)

Lecture 1: Metric ultraproducts.
I will introduce the metric ultraproduct and highlight the manner in which it is used in continuous model theory. Metric structures will be defined along with a variety of examples.

Lecture 2: Basic model theory: continous vs. discrete, compare and contrast.
There are many direct analogies between continuous model theory and the classical case. However, there are also some potential pitfalls. I will highlight some of both.

Lecture 3 Definable sets.
The notion of definable sets is central to the study of continuous model theory. Notwithstanding the terminology, there is no corresponding notion in the classical case and many complications arise from this fact.

Lecture 4: Applications
Examples will be given throughout the tutorial but I want to end by focusing on specific highlights and applications of continuous model theory. I will try to say a few words about Urysohn space, Hilbert space with operators and C*-algebras.

II. NIP, measures and combinatorics, Pierre Simon (Université Claude Bernard - Lyon 1)

A remarkable recent development in model theory is the use of measures with applications to definable groups and combinatorics, in particular under the NIP setting. In my tutorial, I will present the NIP hypothesis and discuss Keisler measures in various contexts: NIP, stable and distal.

III. Descriptive set theory and model theory, Phillip Wesolek (Université catholique de Louvain)

We shall present a number of topics at the intersection of descriptive set theory and model theory dealing primarily with the structure of automorphism groups of first order structures. These will include

- Large scale geometry of automorphism groups and first order structures
- Structure of conjugacy classes and topological rigidity of automorphism groups
- Topological dynamics of automorphism groups

IV. Topological Dynamics and Model Theory, Krzysztof Krupiński (University of Wrocław)

For a given topological group G, by a G-flow we mean a pair (G, X), where X is a compact space on which G acts continuously. We will discuss basic notions of topological dynamics such as universal ambits, universal minimal flows, the Ellis semigroup and the Ellis group of a given flow. Then we will focus on the discrete situation (i.e. when the topology on G is discrete). Next, we will generalize the discrete context to the model-theoretic context when the group G is definable in a model; one has natural categories here of definable and externally definable G-flows. We will mainly focus on connections between the Ellis group of the universal externally definable G-ambit and quotients by various model-theoretic connected components (in particular, with the so-called definable Bohr compactification of G which will be described during the course). We will discuss Newelski's conjecture concerning these connections and further research around it. If time permits, we will also discuss a variant of the whole approach for the group of automorphisms of the monster model of a given theory (in place of the definable group G) acting on an appropriate space of global types. This has strong consequences for understanding the complexity (especially from the point of view of Borel cardinalities) of bounded invariant equivalence relations.