SEMINAR PROGRAM "PROSPECTOS EN TOPOLOGÍA". SEMESTER 2026-2

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During the 2026-2 term, the Seminar "Prospectos en Topología" will have three thematic blocks, namely:

(i) Configuration spaces and Graphs.
(ii) Actions of Big Mapping class groups.
(iii) Bass-Serre-Theory and current applications in fundamental groups of three-manifolds.

The seminar will also feature a number of individual talks. The schedule for the talks is as follows:

(i) **Configuration Spaces and Graphs**
- **February 9th:** Introduction to configuration spaces. The objective is to give the definition of the n-configuration space of a topological space X. We will see its basic properties and some classical results in the area. We will follow [Coh10, Kal24] as the main references. (Andrés Carnero)
- **March 2nd:** (Omar Alvarado Garduño).
- **March 9th:** Generalized configuration spaces. The objective is to define a generalization of configuration spaces. Given a space X and a simplicial complex K on n vertices, we will see the basic properties of the space X_K which is a subspace of X^n where the coordinates indexed by a of a non-simplex must be different. We will focus particularly to the case where K is the independence complex of a graph, we will see that the euler characteristic for particular spaces X is related to the chromatic polynomial of the graph [CdSS19, EH07, Kal24]. (Andrés Carnero)

(ii) **Actions of Big Mapping class groups**
- **March 23rd:** General Introduction. The talk will feature the main interest of understanding actions of Big mapping class groups from the viewpoint of bounded cohomology and geometric group theory, but having a general context of ergodicity.
- **April 6th:** Classification of hyperbolic actions of big mapping class groups. The goal will be to give a highlight of the main ideas behind the work of Horbez-Qing-Rafi, [HQR22] which characterizes the big mappingn class groups acting continuously on hyperbolic spaces.
- **April 13th:** The talk will have as objective to show the most important ideas behind the article Geometric models and asyptotic dimension of big mapping class groups, by Kopreski and shaji [KS25].

(iii) **April 20th:** Individual talk, TBA.
(iv) **Bass-Serre Theory and currnt applications in three manifold groups.**

Date: December 7, 2025.

- **April 27th:** General Introduction and Structure Theorem. In this session, we will define the basic notions of Bass–Serre Theory, namely graphs of groups and the notion of their fundamental group. The main goal is to present the Structure Theorem. This result can be consult in [Ser03], although there are alternative proofs, for example the one given in [SWW79].
- **May 4th:** Fundamental Groups of 3-manifolds. In this talk, we will recall some important results on the classification of 3-manifolds in order to apply Bass–Serre Theory to understand the different types of fundamental groups arising from these spaces. The main reference will be [AFW15]. (Luis Eduardo García Hernández)

(v) **May 11th:** Individual talk, TBA.
(vi) **May 18th:** Individual talk, TBA.
(vii) **May 25th:** Individual talk, TBA.

References

[AFW15] Matthias. Aschenbrenner, Stefan Friedl, and Henry Wilton. *3-manifold groups*. EMS Series of Lectures in Mathematics. European Mathematical Society (EMS), Zürich, 2015.

[CdSS19] Andrew A. Cooper, Vin de Silva, and Radmila Sazdanovic. On configuration spaces and simplicial complexes. *New York J. Math.*, 25:723–744, 2019.

[Coh10] Frederick R. Cohen. Introduction to configuration spaces and their applications. In *Braids*, volume 19 of *Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap.*, pages 183–261. World Sci. Publ., Hackensack, NJ, 2010.

[EH07] Michael Eastwood and Stephen Huggett. Euler characteristics and chromatic polynomials. *European J. Combin.*, 28(6):1553–1560, 2007.

[HQR22] Camille Horbez, Yulan Qing, and Kasra Rafi. Big mapping class groups with hyperbolic actions: Classification and applications. *Journal of the Institute of Mathematics of Jussieu*, 21(6):2173–2204, 2022.

[Kal24] Sadok Kallel. Configuration spaces of points: A user's guide. *https://arxiv.org/abs/2407.11092*, 2024.

[KS25] Michael C. Kopreski and George Shaji. Geometric models and asymptotic dimension for infinite-type surface mapping class groups. *https://arxiv.org/abs/2508.06679*, 2025.

[Ser03] Jean-Pierre Serre. *Trees*. Berlin ; New York : Springer-Verlag, second edition, 2003.

[SWW79] Peter Scott, Terry Wall, and C. T. C. Wall. *Topological methods in group theory*, page 137–204. London Mathematical Society Lecture Note Series. Cambridge University Press, 1979.

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