Graduate Students Seminar: Infinitary Combinatorics

Arturo Martínez-Celis

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Outline: In this seminar we will present an introduction to many of the most active research topics in Combinatorial Set Theory. We will begin with an axiomatic approach to ordinals and cardinals. After that we will focus on the main theorems and main examples in the topics listed below. We will also see some applications to different branches of mathematics.

Syllabus:

1. Ordinals and Cardinals
2. Ideals and Filters (on $\mathbb{N}$ and $\mathbb{R}$)
3. Almost Disjoint Families
4. Forcing Axioms
5. Cardinal Invariants of the Continuum
6. Applications to Topology and Analysis

Requirements: A basic course on Set Theory, General Topology and Analysis.

Bibliography:

1. Winfried Just and Martin Weese. *Discovering modern set theory. I*, volume 8 of *Graduate Studies in Mathematics*. American Mathematical Society, Providence, RI, 1996. The basics
2. Winfried Just and Martin Weese. *Discovering modern set theory. II*, volume 18 of *Graduate Studies in Mathematics*. American Mathematical Society, Providence, RI, 1997. Set-theoretic tools for every mathematician
3. Matthew Foreman and Akihiro Kanamori, editors. *Handbook of set theory. Vols. 1, 2, 3*. Springer, Dordrecht, 2010
4. Kenneth Kunen and Jerry E. Vaughan, editors. *Handbook of set-theoretic topology*. North-Holland Publishing Co., Amsterdam, 1984

5. Tomek Bartoszyński and Haim Judah. *Set theory.* A K Peters, Ltd., Wellesley, MA, 1995. On the structure of the real line

6. Lorenz J. Halbeisen. *Combinatorial set theory.* Springer Monographs in Mathematics. Springer, London, 2012. With a gentle introduction to forcing

7. Thomas Jech. *Set theory.* Springer Monographs in Mathematics. Springer-Verlag, Berlin, 2003. The third millennium edition, revised and expanded