אוניברסיטת
בן-גוריון בנגב

The Department of Mathematics

2016–17–B term

Course Name Classical Set Theory

Course Number 201.1.0371

Course web page
`https://www.math.bgu.ac.il//en/teaching/spring2017/courses/classical-set-theory`

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Office Hours `https://www.math.bgu.ac.il/en/teaching/hours`

Abstract

Requirements and grading[1]

Course topics

The course covers central ideas and central methods in classical set theory, without the axiomatic development that is required for proving independence results. The course is aimed as 2nd and 3rd year students and will equip its participants with a broad variety of set theoretic proof techniques that can be used in dffierent branches of modern mathematics.

Sylabus

- The notion of cardinality. Computation of cardinalities of various known sets.
- Sets of real numbers. The Cantor-Bendixsohn derivative. The structure of closed subsets of Euclidean spaces.
- What is Cantor's Continuum Hypothesis.
- Ordinals. Which ordinals are order-embeddable into the real line. Existence theorems ordinals. Hartogs' theorem.

[1] Information may change during the first two weeks of the term. Please consult the webpage for updates

- Transfinite recursion. Applications.
- Various formulations of Zermelo's axiom of Choice. Applications in algebra and geometry.
- Cardinals as initial ordinals. Hausdorff's cofinality function. Regular and singular cardinals.
- Hausdorff's formula. Konig's lemma. Constraints of cardinal arithmetic.
- Ideal and filters. Ultrafilters and their applications.
- The filter of closed and unbounded subsets of a regular uncountable cardinal. Fodor's pressing down lemma and applications in combinatorics.
- Partition calculus of infinite cardinals and ordinals. Ramsey's theorem. The Erdos-Rado theorem. Dushnik-Miller theorem. Applications.
- Combinatorics of singular cardinals. Silver's theorem.
- Negative partition theorems. Todorcevic's theorem.
- Other topics

Bibliography.

.1 Winfried Just and Martin Wese. Discovering modern set theory I, II. Graduate Studies in Mathematics, vol. ,8 The AMS, .1996

.2 Azriel Levy. Basic Set Theory. Dover, .2002

.3 Rafl Schindler. Set Theory. Springer .2014