אוניברסיטת
בן-גוריון בנגב

The Department of Mathematics

2023–24–A term

Course Name Logic

Course Number 201.1.6061

Course web page
`https://www.math.bgu.ac.il//en/teaching/fall2024/courses/logic`

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

Abstract

.1 Introduction and historical background: the Hilbert-Witehead program, paradoxes in set theory, independence theorems.

.2 First order logic: formulas, structures truth value of a formula in a model, calculus with and without equality.

.3 Goedel's Completeness theorem: deduction systems for propositional logic, the completeness theorem for propositional logic and for first order logic. The model existence theorem and the compactness theorem.Applications and corollaries (Upward Lowenheim-Skolem).

.4 Goedel's incompleteness theorem: codes, Goedel's fixed point theorem, Tarski's theorem on the non-definability of truth.

.5 Corollaries of incompleteness, as time allows.

Requirements and grading[1]

85% Take home exam. 10% HW assignments. 5% HW grading (fi no grader is found, In case a grader is found these 5% will be added to the take home exam).

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

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Course topics

- An axiom system for predicate calculus and the completeness theorem.
- Introduction to model theory: The compactness Theorem, Skolem–Löwenheim Theorems, elementary substructures.
- Decidability and undecidability of theories, Gödel first Incompleteness Theorem.