

The Department of Mathematics

2023–24–A term

Course Name Logic

Course Number 201.2.6061

Course web page

<https://math.bgu.ac.il/en/teaching/fall2024/courses/logic>

Lecturer Prof. Assaf Hasson, <hassonas@bgu.ac.il>, Office 204

Office Hours <https://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 grading¹

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

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



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.