האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

AXIOMATIC SET THEORY - 80650

Last update 04-11-2024

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Mathematics

Academic year: 2025

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Yair Hayut

Coordinator Email: yair.hayut@mail.huji.ac.il

Coordinator Office Hours:

Teaching Staff:

Prof. Hayut Yair

Course/Module description:

During this course we shall introduce the formal framework for Set Theory: The Axiom system of Zermello-Fraenkel (ZFC). We shall formally introduce some basic notions like: ordinals, cardinals, wellfoundedness and basic concepts of combinatorial Set Theory. We shall prove some easy cases of independence (For instance the independence of the axiom of replacement)
We shall prove the consistency of the axiom of choice, using the model of hereditarily ordinal definable sets. We shall present the constructible universe (L) and we shall use it to prove the consistency of the Generalized Continuum Hypothesis.
We will give an introduction to large cardinals. We will talk about measurable cardinals, weakly and strongly compact cardinals.
Time permitting, we shall talk about an advanced topic at the end of the course (e.g., Ramsey cardinals, Suslin trees, zero sharp, etc.)
Given the interests of the participants, additional topics or different ones can be taught.

Course/Module aims:

Learning outcomes - On successful completion of this module, students should be able to:

Ability to prove and apply the theorems presented in the course.

Ability to apply correctly the mathematical methodology in the context of the course.

Acquiring the fundamentals as well as basic familiarity with the field which will assist in the understanding of advanced subjects.

Ability to understanding and explain the subjects taught in the course.

Attendance requirements(%):

0

Teaching arrangement and method of instruction:

Course/Module Content:

1) The basic axioms, ZFC.
2) Ordinals, cardinals, well-foundedness.
3) Few easy cases of independence.
4) The consistency of the Axiom of Choice and the Generalized Continuum Hypothesis.
5) L and HOD
6) Large cardinals: measurable, weakly and strongly compact.

Additional or different topics might be given.

Required Reading:
None

Additional Reading Material:

Grading Scheme:
Home Exam % 40
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 60 %

Additional information:
The final grade will be composed of exercises (60%) and a final assignment (40%).