

The Hebrew University of Jerusalem

Syllabus

SET THEORY - 80200

Last update 18-04-2020

<u>HU Credits:</u> 3

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Mathematics

<u>Academic year:</u> 0

Semester: 2nd Semester

<u>Teaching Languages:</u> Hebrew

<u>Campus:</u> E. Safra

Course/Module Coordinator: Prof. Omer Ben-Neria

Coordinator Email: omer.bn@mail.huji.ac.il

<u>Coordinator Office Hours:</u> set a time in advanced

Teaching Staff:

Prof Omer Ben-Neria Mr. Ur Ben-Ari

Course/Module description:

Set Theory deals with sets, which are the most fundamental mathematical structures.

The course centers around two aspects of set theory:

 Development of the theory of infinite cardinalities and cardinal arithmetic.
 Set theory as a foundation of mathematics, and development of tools for infinite constructions such as the Axiom of choice, the well order principle, and Zorn's Lemma.

The course touches on some of the basics of the study of independence proofs in set theory. A subject which is further developed in advanced courses.

<u>Course/Module aims:</u>

1. Knowledge of the theorems and methods of set theory. 2.Developing a Mathematical viewpoint based on Set Theory.

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

1. Know the theorems and methods of set theory. Developing a Mathematical viewpoint based on Set Theory.

2. Understand how mathematics can be based on set theory.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: Lecture + exercise

<u>Course/Module Content:</u>

The subjects studied in the course are:

1. The axioms which determine what sets are: The axiom of extensionality and the axiom of comprehension. Russel's paradox. The axioms derived from the axiom of comprehension. Classes. Ordered pairs, relations and functions.

2. Finite and countable sets. Comparison of sets. The Cantor-Bernstein theorem and Cantor's power set theorem. Cardinalities.

3. The axiom of choice.

4. Well order. The Ordinals.

5. The well-ordering theorem, comparison of cardinalities, Zorn's lemma, and their equivalence to the axiom of choice.
6. Ordinals which are also cardinals. The generalized continuum hypothesis.

<u>Required Reading:</u> none

<u>Additional Reading Material:</u> Paul Halmos - Naive Set Theory

Set Theory by Shmuel Berger, the Open University (in Hebrew)

Course Notes by Azriel Levy (in Hebrew)

<u>Course/Module evaluation:</u> End of year written/oral examination 80 % Presentation 0 % Participation in Tutorials 0 % Project work 0 % Assignments 20 % Reports 0 % Research project 0 % Quizzes 0 % Other 0 %

Additional information:

If the final examination could not be conducted in its usual form, an online version would be given instead.

If an online examination will not be possible either, the grade will be determine according to the homework.