האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

DISCRETE MATHEMATICS for Odyssey program - 49680

Last update 04-04-2025

HU Credits: *5*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Young Scientist*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dr. Alex Gourevich*

Coordinator Email: *youth@math.huji.ac.il*

Coordinator Office Hours:

Teaching Staff:

Dr. Alex Gourevich,
Mr. Ben Baskin

Course/Module description:

1. Logic – Boolean operations, truth tables, propositional calculus and semantic
2. Set theory – operations on sets, Cartesian product, functions
3. Relations - equivalence and order relations, partially ordered sets
4. Counting problems – counting with and without order importance, set partitions
5. Identities - the binomial and multinomial formulas, combinatorial and algebraic proofs
6. Reflection method - Catalan numbers
7. Inclusion-exclusion principal – enumeration surjective maps, enumeration permutations without fixed point, Euler's function
8. Induction and recursion – proofs by complete induction, solving of combinatorial problems with the aid of recursion, Fibonacci numbers
9. Pigeonhole principle – Erdos-Szekeres theorem
10.Asymptotic analysis - asymptotic analysis of combinatorial problems
11. Graphs – paths, connectivity, cycles, trees, bipartite graphs, Eulerian trails and cycles, Hamiltonian trails and cycles, matching, Hall's marriage theorem, colored graphs, Ramsey theory
Additional topics may be studied.

Course/Module aims:

Providing basic notions of Discrete Math and developing the ability to solve problems.

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

Solve elementary problems in set theory, combinatorics, and graph theory.

Attendance requirements(%):

80%

Teaching arrangement and method of instruction: lecture + exercise session

Course/Module Content:

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Required Reading:
none

Additional Reading Material:

Grading Scheme:
Written / Oral / Practical Exam 90 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 10 %

Additional information: