האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

DISCRETE MATHEMATICS - 80181

Last update 08-05-2024

HU Credits: *5*

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

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *1st and/or 2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Alex Gurevich, Eran Nevo*

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

Coordinator Office Hours: *see moodle*

Teaching Staff:

Dr. Noa Nitzan,
Dr. Alex Gourevich,
Mr. Romano Alon,
Dr. Orit Raz,
Prof Eran Nevo,
Mr. Ben Baskin,
Mr. Dor Ziv,
Mr. Massalhah Sobhi,
Ms. Inbar Oren

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.
In the academic year 2023-2024, Reflection method, Catalan numbers, Asymptotic analysis, matching and the marriage theorem will not 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(%):

none

Teaching arrangement and method of instruction: lecture + exercise session

Course/Module Content:

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Required Reading:

none

Additional Reading Material:

Nati Liniel, Michal Parnas,
Discrete Mathematics (Hebrew)

Grading Scheme:

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

Additional information:

Grading schemes in semester A and semester B may be different. See the course

regulations on the website in Moodle.