Course program and reading list

Semester 1 Year 2021

School: Efi Arazi School of Computer Science B.Sc

Discrete Mathematics

Lecturer:

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Tutors:

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Course No.:	Course Type :	Weekly Hours :	Credit:
56	Lecture	5	5

Course Requirements :	Group Code :	Language:
Final Exam	211005601	Hebrew

Course Description

This is an introductory course in discrete mathematics oriented toward Computer Science. Topics taught in the course include fundamental mathematical concepts (definitions, proofs, sets, relations, functions, partial orders, proofs by induction) and counting (permutations, combinations, the inclusion-exclusion principle).

Course Goals

On completion of the course, students will be able to explain and apply the basic methods of discrete (noncontinuous) mathematics in Computer Science. They will be able to use these methods in subsequent courses: in the design and analysis of algorithms, data structures, computability and computational complexity theory, and computer systems.

One very important skill that students will be required to pick up during this course is that of writing **clear, convincing, mathematical proofs**. In particular, the mathematics in this course will not be just about calculation; but rather more about making (and clearly presenting) mathematically rigorous arguments and about learning to **recognize faulty reasoning**.

Grading

Final (90% of course grade).

Homework (10% of course grade).

Learning Outcomes

By the end of the course students should be able to:

1. Use **logical notation** to define and reason about {\bf fundamental mathematical concepts} such as sets, relations, functions, and integers.
2. **Evaluate elementary mathematical arguments** and identify fallacious reasoning (not just fallacious conclusions).
3. **Synthesize induction hypotheses and simple induction proofs**.
4. **Calculate numbers of possible outcomes** of elementary combinatorial processes such as permutations and combinations.
5. Problem solve and **study in a small team** with fellow students.

Lecturer Office Hours

Mondays 17:30-18:30.

Reading List

The course will have no textbook. However, the lecture notes for the MIT 6.042 course will be closely followed. The web site will contain a link to these lecture notes, and in each lecture we will point out the relevant chapters. For students that are interested in reading material beyond what is covered in the lecture notes, here are a few other sources:

1. Discrete Mathematics, N.~Linial and M.~Parnas.
2. Discrete Mathematics and its Applications. K.~Rosen.
3. Discrete Mathematics: Set Theory, Combinatorics and Logic. The Open University (20283).
4. Discrete Mathematics. The Open University (20276).
5. How to Solve It -- a new aspect of mathematical method. George Polya.