HELWAN University

Faculty of Computers and Information

Department of Computer Science
MA 112: Discrete Mathematics
Course Syllabus

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Office Hours Check webpage

Text Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 6th ed., McGraw-Hill.

Prerequisite No prerequisite.

Objectives This course is a fundamental course for any computer science student. **Students should learn in this course how to be rigorous and start thinking mathematically, with pencil and paper, before putting their hands on the computer writing a program to solve a problem**. The basics of different areas in mathematics will be taught, e.g., logic and proofs, sets and functions, induction and recursion,…etc. A good theoretical understanding of computer science, as well as any science, is based on understanding mathematics.

Homework There will be a new assignment every week; problems will be assigned from the book. Every student has to solve the homework at home, to leave the time of the weekly sections for technical questions and discussions with the TAs. **No late assignments please; copied ones get no marks, are considered cheating and violation to the ethical code, and influence the whole grade.**

Grading Homeworks 10%, midterms 30%, and final exam: 60%.

Syllabus:

Lec.	Ordinary Course		Advanced Course	
	Book Sections	**Topic**	**Book Sections**	**Topics**
1	1.1	Introduction, propositional logic	1.1—1.4.	Mathematical Logic
2	1.2, 1.3	Propositional logic, predicates and Quantifiers	1.5—1.7.	Mathematical Logic (cont.), Proofs
3	1.4, 1.5	Nested quantifiers, rules of inference	2.1—2.3.	Sets and Functions
4	1.6, 1.7	Proofs	2.4, 3.2, 3.3	Sequences, Summation, function Growth, Complexity
5	2.1, 2.2	Sets, and set operations	3.4, 3.5, 3.8	Integers, Primes, Matrices
6	2.3, 2.4	Sequences and summations	4.1—4.3 (omit trees)	Induction, Strong induction, Recursive structures.
7	3.4, 3.5	Integers, division, primes, and GCD.	5.1, 5.2 (first pages), 5.3	Counting, permutation, combination.
8	4.1, 4.2	Mathematical induction, strong induction, and well ordering property	7.1, 7.2	Recurrence and solving recurrence relations.
9	4.3, 5.1	Recursive definition, structural induction, and basics of counting	7.3, 7.4, 7.5	Divide-and-Conquer with recurrence, Generating functions
10	5.2, 5.3, 7.1	Pigeonhole principle, permutations and combinations, Recurrence relations	8.1, 8.3, 8.5	Relations, equivalence relations
11	7.2, 7.5	Solving recurrence relations, Inclusion-exclusion.	9.1—9.3	Graph
12	3.8, 8.1	Matrices, Relations and their properties.	9.4, 9.5	Graph (Cont)
13	8.3, 8.5	Representing relations, equivalence relations.		
14	9.1, 9.2	Graph models and terminology.		