Brooklyn College
Department of Computer and Information Science

CISC 2210 [11] Introduction to Discrete Structures
3 hours; 3 credits

Elementary set theory, functions, relations, and Boolean algebra. Switching circuits, gating networks. Definition and analysis of algorithms. Applications of graph theory to computer science. Related algorithms. Introduction to combinatorial computing and counting arguments. Introduction to error analysis.

Objectives
By course-end the student will be able to understand and use:

1. Simple proofs of mathematical statements (mathematical induction, indirect arguments) and logical propositions (including quantifiers).
2. Fundamental concepts of set theory and Boolean Algebra. Functional and relational properties (one-to-one, onto, reflexive, symmetric, transitive, equivalence, partial ordering), and operations (composition, transitive closure).
3. Basic matrix operations. Graph algorithms and their application to computer science.   Tree traversal algorithms.
4. Counting principles, countable and uncountable sets. Basic probability theory and applications.
5. Big O Notation. Recursive definitions and solutions of simple of recurrence relations.

Syllabus

Week Book Sections   Topic

Week	Book Sections	Topic
1:	1.1, 1.2	Logic, Propositional Operators, Equivalences
2:	1.3, 1.4	Predicates and Quantifiers
3:	1.5	Methods of Proof
4:	1.6, 1.7	Set Theory, operations on sets
5:	1.8	Functions, inverse functions
6:	2.7	Matrices, elementary matrix operations
7:	7.1, 7.3, 7.5	Relations, Equivalence relations
8:	3.1-3.4	Mathematical Induction
9:	4.1-4.3	Counting Principles, Permutations and Combinations
10:	5.1	Introduction to Discrete Probability
11:	6.1-6.3	Recurrence Relations, recursive definitions
12:	8.1-8.3	Graphs
13:	9.1-9.3	Trees, tree traversals
14:	10.1-10.3	Boolean Algebra and Switching Theory

Optional:

* Lattices.
* Soundness and completeness.
* Planarity.
* Grammars.
* Algebraic structure (homomorphism, isomorphism).
* More probability theory.
* Recurrence relations and generating functions.
* Elementary Number Theory.
* Sequences and summations.

Textbook(s)

Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw Hill, 5th Ed., ISBN 0-07-289905

Students Solutions Guide, McGraw Hill, ISBN 0-07-2336102