

Math Methods (COSC 030) Summer 2023

PROFESSOR :

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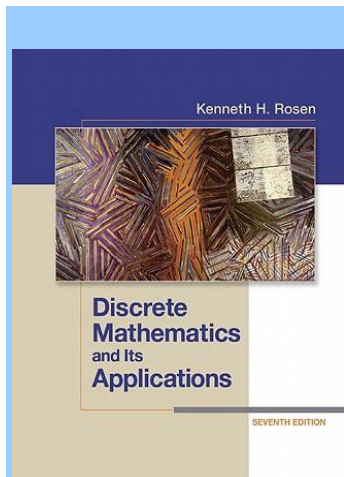
OFFICE HOURS :

M-R: 2.00 - 3.00 PM or by appointment.

TEACHING ASSISTANTS :

Name	Office Hours	Location	Email
XXX	XXX	XXX	XXX@georgetown.edu

TEXT :



Discrete Mathematics and its Applications

Publisher

ISBN:

Kenneth H. Rosen (7th Ed)
(required)

McGraw Hill

978-0-07-338309-5

SYNOPSIS:

This course, designed to be taken concurrently with COSC 052, covers mathematical tools and principles that are valuable to the computer scientist. Topics are generally in the domain of discrete, rather than continuous, mathematics, and include, propositional and predicate logic; mathematical proofs, including induction; counting and basic probability theory; logarithmic and exponential functions; elementary graph theory; and "Big-O" notation and asymptotics.

Notes:

Will be available after each class

COURSE REQUIREMENTS:

Home Work:	60% of your final grade
Mid-Term 1:	15% of your final grade
Finals:	25% of your final grade

IMPORTANT DATES:

Mid-Term 1:	June 22 (R)
Finals:	July 6 (R)

COURSE SCHEDULE :

Lec	Topic	Reading
1	Logic and Proofs	Chap 1
2	Sets and Functions	Chap 2
3	Algorithms	Chap 3
4	Number Theory	Chap 4
5	Induction and Recursion	Chap 5
6	Induction and Recursion	Chap 5
7	Counting	Chap 6
8	Counting	Chap 6
9	Probability	Chap 7
10	Recurrence Relations	Chap 8
11	Recurrence Relations	Chap 8
12	Relations	Chap 9
13	Graphs	Chap 10
14	Trees	Chap 11
15	Boolean Algebra	Chap 12
16	Boolean Algebra	Chap 12
17	Modeling and Computation	Chap 13
18	Modeling and Computation	Chap 13

HOME WORK :

Home Work	Given	Due	Pts	Problems	Sol
1	6-5	6-6	20	hw1	sol
2	6-6	6-7	20	hw2	sol
3	6-7	6-8	20	hw3	sol
4	6-08	6-12	20	hw4	sol
5	6-12	6-13	20	hw5	sol
6	6-13	6-14	20	hw6	sol
7	6-14	6-15	20	hw7	sol
8	6-15	6-19	20	hw8	sol
9	6-20	6-21	20	hw9	sol
10	6-22	6-26	20	hw10	sol
11	6-26	6-27	20	hw11	sol
12	6-27	6-28	20	hw12	sol
13	6-28	6-29	20	hw13	sol
14	6-29	7-03	20	hw14	sol
15	7-03	7-05	20	hw15	sol

Course Objectives

An ability to engage in continuous learning as well as research and assess new ideas and information to provide the capabilities for lifelong learning.

<u>Title</u>	<u>Hours</u>	<u>Description</u>
Logic and Boolean algebra	3	Truth tables; propositional calculus; Boolean algebra and Boolean circuits
Proof techniques	3	direct proof; proofs by counter example, contrapositive, and contradiction; logical equivalence and circles of implication
Number bases	1	binary, hexadecimal
Mathematical induction	4	examples of mathematical induction; strong induction
Sets, relations, functions, congruences	9	sets including Venn diagrams, complements, power sets, operations, DeMorgan's laws; relations including equivalence relations, equivalence classes; functions including injective, surjective, inverse, composition, domain, co-domain, range
Introduction to recursion	4	recursive definitions of functions; factorials; Fibonacci sequences; Towers of Hanoi; other functions and sequences
Graphs and trees	11	directed graphs; undirected graphs; weighted graphs; Eulerian and Hamiltonian circuits; traveling sales person; graph coloring; trees (binary, spanning); expression trees; tree traversals

Learning Outcomes

- Apply mathematical induction and other techniques to prove mathematical results.
- Examine the logical validity of arguments and proofs as they apply to Boolean expressions.
- Illustrate the basic terminology and properties of graphs and trees.
- Perform binary and hexadecimal conversions of numbers.
- Perform computations using recursively defined functions and structures.
- Solve problems involving sets, relations, functions, and congruences.
- Use graphs and trees to solve problems algorithmically.
- Use methods of combinatorics to solve counting problems.

COURSE POLICY:

1. All *Home works* should be turned in at the beginning of the class. Keep the graded home works until the semester is over.
2. Late Home work will NOT be accepted. If you cannot make it to class, its your responsibility to turn it in prior to the due date.
3. Makeups and extensions will be given only Under extreme circumstances (Eg: medical reasons).

COURSE ETHICS:

You can discuss the questions with your classmates, but do not copy the solutions.