CSc 104 : Discrete Structures I
Professor Octavio Betancourt


Grading : 2 Midterm Exams (60%)  
Final Exam (40%)  

MATERIAL TO BE COVERED IN LECTURES AND TEXT :

Chapter
1.- Fundamental Principles of Counting
   1.1 The rules of the sum and product
   1.2 Permutations
   1.3 Combinations : The Binomial Theorem
   1.4 Combinations with repetitions : distributions

2.- Fundamentals of Logic
   2.1 Basic connectives and truth tables
   2.2 Logical equivalence : the laws of logic
   2.3 Logical implication : methods of proof
   2.4 The use of quantifiers

3.- Set Theory
   3.1 Sets and subsets
   3.2 Set operations and the laws of set theory
   3.3 Counting and Venn diagrams

4.- Properties of the Integers : Mathematical Induction
   4.1 The well-ordering principle : mathematical induction

5.- Relations and Functions
   5.1 Cartesian products and relations
   5.2 Functions : plain and one to one
   5.3 Onto functions : Stirling numbers of the 2nd kind
   5.4 Special functions
   5.5 The pigeonhole principle
   5.6 Function composition and inverse functions
7. - Relations : The second time around (maybe, depending on time)

7.1 Relations revisited: properties of relations
7.2 Computer recognition: zero-one matrices and directed graphs
7.3 Partial orders: Hasse diagrams
7.4 Equivalence relations and partitions

10.- Recurrence Relations (maybe, depending on time)

10.1 The First-order linear recurrence relation
10.2 The Second-order linear homogeneous recurrence relation with constant coefficients
10.3 The non-homogeneous recurrence relation

11.- An introduction to Graph Theory

11.1 Definitions and Examples
11.2 Subgraphs, complements and graph isomorphism
11.3 Vertex degree: Euler trails and circuits

12.- Trees

12.1 Definitions, properties and examples
12.2 Rooted trees
12.3 Trees and sorting algorithms
12.4 Weighted trees and prefix codes

13.- Optimization

13.1 Dijkstra's shortest-path algorithm
13.2 Minimal spanning trees: the algorithms of Kruskal and Prim