CSC 330 SYLLABUS
DISCRETE MATHEMATICS FOR COMPUTER SCIENCE
(Version of February 12, 2008)

Prerequisites: Grades of C or better in CSC 210 (Programming) and Math 227(Calculus II)

Course Summary: The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science. We study topics in such areas as sets, matrix algebra, combinatorics, logic, induction and recursive procedures, relations, functions, graphs, and trees. Special attention is given to the algorithmic and coding of these concepts. All CSC majors should take this course.

Topics:

The Language of Mathematics and Computer Science
- Set notation, the algebra and operations of sets, how do you program a set?
- Sequences and Strings, relations and functions including n-ary relations
- Computing representations for relations, Equivalence relations
- Programming sequences and series, summing series. Boolean functions

Logic and Proofs
- Propositional logic, truth tables, propositional equivalences, quantifiers,
- Proofs, direct and indirect, constructive proofs, induction and inductive proofs

Algorithms
- The growth of Functions, Polynomials, Big Oh
- Complexity of computer algorithms and its effect on programs
- Matrices, digraphs, equivalence relations, partial orderings
- Integers and division, GCD, and the Euclidean Algorithm
- Prime and composite numbers, programming prime numbers
- Finite digital registers for computing
- Computability, Halting problem
- Recursive algorithms, recursive definitions, recurrence relations
- Programming recursive equations
- Tail bounds and infinite loops in recursive programs
- Divide and Conquer algorithm techniques
- Cryptography and the RSA Public-Key Cryptosystem

Probability
- Permutations and Combinations, how to program
- Discrete probability theory and the Pigeonhole Principle
- Counting, infinity, countable and uncountable sets

Graphs
- Computer representation of Graphs, Paths, cycles, isomorphism, connectivity
- Euler and Hamilton paths, shortest paths, Graph coloring

Trees
- Traversals, sorting, spanning trees, minimum spanning trees
- Computer representations of trees
- Use of recursion, programming tree programs

Required Textbook

Discrete Mathematics for Computer Science
Author: Haggard, Schlipf, and Whitesides

ISBN-10: 053449501X

Method of Evaluation

Student learning will be evaluated on the basis of

In-Class Participation	05%
Homework	45%
Extra credit projects	05%
Examinations	45%
	100%

Expanded Topics:

Set notation, the algebra and operations of sets, how code a set?	(2 lectures)
Propositional logic, truth tables, propositional equivalences	(3 lectures)
Relations and functions including Boolean functions	(2 lectures)
Computing representations for relations	(1 lecture)
Coding sequences and series and their sums	(1 lecture)
The growth of Functions, Polynomials, Big Oh	(1 lecture)
Complexity of computer algorithms and its effect on programs	(1 lecture)
GCD, Integers and division, the Euclidean Algorithm	(1 lecture)
Finite digital registers for computing	(1 lecture)
Matrices, digraphs, equivalence relations, partial orderings	(2 lectures)
Proofs, direct and indirect, constructive proofs	(3 lectures)
Counting, infinity, countable and uncountable sets	(2 lectures)
Pigeonhole Principle	(1 lecture)
Permutations and Combinations, how to compute	(2 lectures)
Probability	(2 lectures)
Induction	(2 lectures)
Recursion, Recursive algorithms, recursive definitions	(2 lectures)
Solving recursive equations	(1 lecture)
Divide and Conquer algorithm techniques	(1 lecture)
Tail bounds and infinite loops in recursive programs	(1 lecture)
Graphs, isomorphism, connectivity	(1 lecture)
Euler and Hamilton paths, shortest paths, graph coloring	(2 lectures)
Trees, spanning trees, minimum spanning trees, traversals	(2 lectures)
Prime and composite numbers, the Sieve of Aristophenes	(1 lecture)
Computing prime numbers	(1 lecture)
Cryptography and the RSA Public-Key Cryptosystem	(1 lecture)
Computability, Halting problem	(1 lecture)
	40 hours