RUTGERS
NEWARK

DISCRETE STRUCTURES

21:640:237 (3 credits)

COURSE DESCRIPTION:
Sets, relations, functions, graphs, trees, formal expressions, mathematical induction, and some algebraic structures; applications to probability and computer science and enumerative problems in combinatorial analysis. This course covers the fundamental abstract algebraic structures and concepts most often employed in computer science and probability and statistics. The ideas involved are simple, but elegant and useful and the course aims to convey some of the beauty of mathematics as well as its utility. The course integrates theory and practical applications.

This course is required for computer science and information systems majors. It also satisfies a requirement for applied mathematics majors. It does not, however, count for credit towards the mathematics major. Mathematics majors should take 21:640:238 Foundations of Modern Mathematics instead.

PREREQUISITE: 21:640:119 (Basic Calculus), or 21:640:135 (Calculus I), or 21:640:155 (Honors Calculus I.)

TEXTBOOK: "Discrete Mathematics," (7th edition), author Johnsonbaugh, published by Pearson.

DEPARTMENT WEB SITE: http://www.ncas.rutgers.edu/math

THIS COURSE COVERS THE FOLLOWING CHAPTERS AND SECTIONS:
CHAPTER 1: Sets and Logic
1.1 Sets
1.2 Propostions
1.3 Conditional Propositions and Logical Equivalence
1.4 Arguments and Rules of Inference
1.5 Quantifiers
1.6 Nested Quantifiers

CHAPTER 2: Proofs
2.1 Proofs and Counterexamples
2.2 More Proof Methods
2.4 Mathematical Induction
2.5 Strong Induction

CHAPTER 3: Functions
3.1 Functions

3.2 Sequences and Strings
3.3 Relations
3.4 Equivalence Relations
3.5 Matrices of Relations
3.6 Relational Databases

CHAPTER 4: Algorithms
4.1 Introduction
4.2 Examples
4.3 Analysis of Algorithms
4.4 Recursive Algorithms

CHAPTER 7: Recurrence Relations
7.1 Introduction
7.2 Solving Recurrence Relations
7.3 Analysis of Algorithms

CHAPTER 6: Counting Methods (lightly covered)
6.1 Basics
6.2 Permutations and Combinations
6.3 Generalized Permutations and Combinations
6.4 Algorithms
6.5,6.6 Discrete Probability
6.8 Pigeonhole Principle

CHAPTER 5: Number Theory (if time permits)

CHAPTERS 8,9: Trees and Graphs (if time permits)

Department of Mathematics & Computer Science
Smith Hall 216, 101 Warren Street, Newark, New Jersey 07102
Phone: (973) 353-5156 Fax: (973) 353-5270