

BROOME COMMUNITY COLLEGE
Binghamton, New York

COURSE TITLE DISCRETE MATHEMATICS MAT 250

CLASS LECTURE HOURS 4 LAB HOURS 0 CREDIT HOURS 4

DIVISION DEAN William Beston

DEPT. CHAIRPERSON Mort Goldberg DATE April 1993

PREREQUISITE: MAT 182 Calculus II

Learning objectives of Course:

The student should be able to use:

1. Deduction and techniques of problem solving
2. Mathematical Induction
3. Sets, relations and Cartesian product of sets
4. Binary relations, equivalence relations and partial orders
5. Functions, injections, surjections, bijections
6. The Pigeonhole principle
7. The Fundamental counting principle
8. Permutations and combinations
9. Probability
10. Permutations and combinations with unlimited repetition
11. The Binomial theorem
12. The Multinomial theorem
13. The Principle of inclusion-exclusion
14. Graph models
15. Isomorphic, complete and bipartite graphs
16. The degree of a vertex and related theorems
17. Walks, paths, trails, circuits of a graph
18. Eulerian and Hamiltonian graphs
19. Planar and nonplanar graphs
20. Trees, spanning trees
21. Minimum length paths, minimum weight trees
22. Optimal binary trees
23. Generating functions
24. Recurrence relations and find their solutions

CATALOG COURSE DESCRIPTION:

Sets, functions, mathematical induction, relations, partially ordered sets, combinatorics including permutations, the pigeonhole principle, binomial and multinomial coefficients, recurrence relations, generating functions, the principle of inclusion-exclusion. Graph theory, including paths and connectedness, minimum length paths, Eulerian and Hamiltonian graphs, graph isomorphisms, trees, planar and nonplanar graphs.

4 Class Hours; Prerequisite: MAT 182 Calculus II

MAT 250

Discrete Mathematics

Course outline

- I. Sets, Functions and Proof Techniques
 - Definitions
 - One-to-one Correspondences
 - Countable and Uncountable Sets
 - Functions
 - Induction

- II. Relations
 - Properties of Relations
 - Equivalence Relations
 - Partial Orders
 - Maximal/minimal Elements
 - Order Isomorphisms

- III. Combinatorics
 - Multiplication Rule
 - Pigeonhole Principle
 - Permutations
 - Combinations
 - Binomial Coefficients
 - Multinomial Coefficients
 - Recurrence Relations

- IV. More on Combinatorics
 - Permutations with Repetitions
 - Combinations with Repetitions
 - Linear Equations with Unit Coefficients
 - Principle of Inclusion-Exclusion
 - Probability
 - Generating Functions

- V. Graph theory
 - Paths and Connectedness
 - Eulerian and Hamiltonian Graphs
 - Planar Graphs
 - Graph Isomorphisms
 - Trees
 - Binary Search Trees
 - Minimal Spanning Trees
 - Directed Graphs