If Revision, Section(s) Revised: **C, H**

Date of Previous Revision: **May 1997**

Date of Current Revision: **September 2004**

C: MATH 2230 **D**: **Discrete Mathematics II** **E: 3**

Subject & Course No. , g

enerating functions, equivalence relations, partial orders, partitions, graphs and trees, cycles and paths, shortest-path algorithms, minimal spanning trees, tree traversal and applications of trees and graphs.

G: Allocation of Contact Hours to Type of Instruction / Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture

Number of Contact Hours: (per week / semester for each descriptor)

4 hours per week

Number of Weeks per Semester:

15

H: Course Prerequisites:

MATH 1130

I: Course Corequisites:

None

J: Course for which this Course is a Prerequisite

None

K: Maximum Class Size:

35

L: PLEASE INDICATE**:**

	Non-Credit
	College Credit Non-Transfer
X	College Credit Transfer:

SEE BC TRANSFER GUIDE FOR TRANSFER DETA

M: Course Objectives / Learning Outcomes

The student should be able to:

determine whether a set is countable or uncountable;
demonstrate Cantor's diagonalization process;
devise recursive algorithms and compare with iterative algorithms;
use a loop invariant to prove that a program segment is correct;
determine the worst-case and average-case complexity of a simple algorithm;
determine the number of ordered and unordered selections of *r* elements chosen with and without repetition from a set with *n* elements;
determine the permutations of sets with indistinguishable objects;
enumerate the ways distinguishable objects can be placed into distinguishable boxes;
develop an algorithm to generate permutations of a set;
develop a recurrence relation to model a problem;
solve recurrence relations iteratively;
solve linear homogeneous recurrence relations with constant coefficients of degree two;
verify solutions to linear inhomogeneous recurrence relations;
determine the big-O of divide-and-conquer recurrence algorithms such as the binary search;
apply the inclusion-exclusion principle to problems with more than two sets;
use the principle of inclusion-exclusion to solve counting problems modeled after the problem of finding the number of integer solutions of a linear equation with constraints;
solve counting problems modeled after the number of onto functions from one finite set to another;
count the number of derangements of a set and solve counting problems based on this principle;
derive generating functions for a sequence;
use ordinary and exponential generating functions to solve counting problems;
use a generating function to solve a recurrence relation;
determine if a relation is an equivalence relation;
determine the equivalence classes of an equivalence relation;
determine if a collection of subsets is a partition of a given set;

N: Course Content:

1. Infinite Sets, Computability and Recursion
   1.1. Cardinality of infinite sets
   1.2. Recursion and iteration
   1.3. Complexity of algorithms
   1.4. Program correctness

2. Advanced Counting
   2.1. Permutations and combinations with repetition
   2.2. Indistinguishable and distinguishable objects
   2.3. Recurrence relations
   2.4. Solving first and second order linear recurrence relations
   2.5. Generating functions
   2.6. Solving recurrence relations using generating functions
   2.7. Solving counting problems using generating functions
   2.8. Divide-and-conquer relations
   2.9. Applications of inclusion-exclusion

3. Relations
   3.1. Equivalence relations and partitions
   3.2. Partial orderings and Hasse diagrams

4. Graphs
   4.1. Representations
   4.2. Connectivity
   4.3. Euler and Hamilton paths
   4.4. Shortest path problems

5. Trees
   5.1. Applications
   5.2. Tree traversals
   5.3. Trees and sorting
   5.4. Spanning trees
   5.5. Minimum spanning trees

5.5.

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

None

Course Designer(s)	Natasha Davidson	Education Council / Curriculum Committee Representative	
Dean / Director	Des Wilson	Registrar	Trish Angus

© Douglas College. All Rights Reserved.