

# **COURSE OUTLINE**

## **MATH 220**

### **Discrete Structures**

**3 Semester Hours**

## **HOWARD COMMUNITY COLLEGE**

### **Course Description**

Upon completion of this course, students, will develop skills in fundamental mathematical concepts related to computer science. The course will discuss the areas of finite and infinite sets, relations, functions, propositional logic, permutations, combinations, proof techniques, and elementary graph theory with selected applications. Selected applications will be included. Prerequisite: MATH 181.

### **Statement on General Education and Liberal Learning**

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

### **Overall Course Objectives**

Upon completion of this course, the student will be able to:

1. Develop simple direct and indirect proofs.
2. Provide proofs by mathematical induction; use summations including geometric and arithmetic series.
3. Define and construct unions, intersections, disjoint sets, symmetric difference, Venn Diagrams, DeMorgan's Laws, power sets, cardinality, countable and uncountable sets.
4. Use elementary propositional logic, construct truth tables, and use connectives; identify valid and invalid arguments.
5. Define function; define injective, surjective and bijective functions.
6. Define algorithm and distinguish between functions and algorithms.
7. Define, graph, and diagram binary relations, recurrence relations, and 2<sup>nd</sup> order recurrence relations.
8. Solve elementary problems involving permutations, combinations, and the pigeonhole principle.
9. Determine probabilities of events in simple spaces; use the binomial theorem in probability.
10. Define and identify elementary properties of paths, connected graphs, Eulerian and Hamiltonian graphs, and trees.

## **Major Topics**

- I. Proofs  
Mathematical Induction
- II. Logic & Sets
- III. Relations, functions and algorithms
- IV. Elementary probability
- V. Elementary Graph Theory

## **Course Requirements**

Grading/Exams: Grading procedures will be determined by the individual faculty member within the guidelines of the Mathematics Division and will include several unit exams, projects involving MATLAB and a comprehensive departmental final exam.

Technology requirements: Graphing calculator (TI-84 recommended) and required course software.

## **Other Course Information**

This course may be used as a Mathematics core course or as an Arts and Science elective. Check with your transfer institution concerning transferability for your program.