

# COURSE OUTLINE

## MATH 122

### Ideas in Mathematics

3 Semester Hours

## HOWARD COMMUNITY COLLEGE

### Description

In this course students will develop the ability to reason with quantitative information, through the study of the principles of reasoning, logic, number sense, probability and statistical reasoning, and mathematical modeling. Students will acquire the specific background and critical thinking skills they need to understand the major issues they will face in life, both on a personal level and as citizens in a modern democracy. There will be an emphasis upon contemporary applications to various real-life problems. This course is intended for students who do not plan to major in mathematics or the sciences. Prerequisite: MATH 070 or appropriate score on math placement test. (3 hours weekly)

### 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 have demonstrated the ability to:

1. Apply the properties of sets.
2. Use truth tables to solve various logic problems.
3. Determine the validity of and identify common fallacies in arguments through truth tables and Euler diagrams.
4. Apply Venn diagrams to sets, counting and logic problems.
5. Solve counting problems with permutations and combinations.
6. Calculate simple and compound probabilities.
7. Interpret statistical graphs, specifically histograms, and box and whisker plots.
8. Calculate and interpret statistical measurements of central tendency and dispersion.
9. Explain the relationship between statistical inference and probability.
10. Solve various problems using the Normal distribution.
11. Make predictions based upon mathematical models (linear, exponential, and logarithmic).
12. Explain the impact of exponential growth.
13. Solve exponential and logarithmic application problems.
14. Apply network analysis to solve various problems.

## **Major Topics**

- I. Sets
  - A. Basic Properties of Sets
  - B. Subsets
  - C. Set Operations
  - D. Applications of Sets
  
- II. Logic
  - A. Logic Statements and Quantifiers
  - B. Truth Tables and Applications
  - C. The Conditional and the Biconditional
  - D. Arguments
  - E. Euler Diagrams
  
- III. Graph Theory
  - A. Euler and Hamiltonian Circuits
  - B. Efficient Routes and the Greedy Algorithm
  - C. Planarity and Euler's Formula
  
- IV. Applications of Functions
  - A. Exponential Functions and Applications
  - B. Logarithmic Functions and Applications
  
- V. Combinatorics and Probability
  - A. Counting
  - B. Permutations and Combinations
  - C. Probability and Odds
  - D. Addition and Complement Rules
  - E. Conditional Probability
  - F. Expectation
  
- VI. Statistics
  - A. Measures of Central Tendency and Dispersion
  - B. Measures of Relative Position
  - C. Normal Distribution
  - D. Linear Regression and Correlation

## **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 and a comprehensive departmental final exam.

A graphing calculator (TI-83 or TI-84) is required.

## **Other Course Information**

This course is a Mathematics core course and an Arts and Science elective.