# MATH 163
# Pre-Calculus 1
3 Credits

Community College of Baltimore County
Common Course Outline

## Description

**MATH 163 – Pre-Calculus 1:** is a course that explores the nature and scope of college mathematics through the study of functions. Topics include the study of polynomial, rational, radical, piece-wise defined, and absolute value functions and their graphs and applications, as well as modeling with these functions. Additional topics include complex numbers, inverse functions, operations with functions, and exponential and logarithmic functions, as well as their graphs and applications.

**Pre-requisites:** ACLT 053 or (ESOL 052 and ESOL 054); MATH 083 or a sufficient score on the placement exam

## Overall Course Objectives

Upon completion of this course, students will be able to:

1. articulate solutions to mathematical problems using clear written and/or oral communication;
2. solve inequalities, including absolute value inequalities and rational inequalities;
3. utilize appropriate notation, including interval notation for solutions to inequalities for the domain and range of function;
4. produce graphs of functions, using translations, symmetry, end behavior, and asymptotes;
5. evaluate functions using addition, subtraction, multiplication, division, or functional composition and inverses;
6. model numerical data using functions to analyze data and predict values;
7. analyze graphs and equations of rational, polynomial, and piecewise functions;
8. apply the Fundamental Theorem of Algebra and Theory of Equations;
9. solve exponential, logarithm, radical, polynomial, and rational equations and their applications;
10. construct a solution to real world problems using problem solving methods and critical thinking;
11. examine the mathematical contributions made by people from diverse cultures throughout history through project, research, applications, and/or group activities;
12. apply appropriate technology to the solution of mathematical problems; and
13. find, evaluate, use, and cite appropriate academic resources for mathematical research.

## Major Topics

I. Absolute value equations and inequalities
   a. Absolute value equations

b. Absolute value inequalities

II. Functions
   a. Review domain, range, functional notation
   b. Modeling data with linear regression function
   c. Review parallel and perpendicular functions
   d. Review quadratic functions and their graphs
   e. Graphing techniques using shifting/stretching techniques
   f. Absolute value and piecewise defined functions and their graphs

III. Polynomial Functions
   a. Graphs of polynomial functions
   b. Zeros of polynomial functions
   c. Complex numbers and theory of equation
   d. Fundamental Theorem of Algebra
   e. Modeling with polynomial functions

IV. Rational Functions and Radical Functions
   a. Graphs of rational functions
   b. Graphs of radical functions
   c. Equations and inequalities of rational and radical functions

V. Combinations of Functions
   a. Arithmetic operations on functions
   b. Composition of functions
   c. One-to-one functions
   d. Inverse functions

VI. Exponential and Logarithmic Functions
   a. Definition and graphs of exponential functions
   b. Definition and graphs of logarithmic functions
   c. Properties of logarithms
   d. Solving exponential and logarithmic equations
   e. Applications of exponential and logarithmic functions

**Course Requirements**

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- two exams in addition to the final exam
- a written project which addresses the General Education Program Outcomes
- a comprehensive final exam will count between 20% and 30% of the total weighted course grade
- 70% of the semester grade will be proctored
- other components, such as group work, may be part of the grade

Written assignments and research projects: Students are required to use appropriate academic resources in their research and cite sources according to the style selected by their professor.

**Other Course Information**

This course is an approved 3–credit General Education course in Mathematics.

One or more assignments will infuse CCBC General Education Program outcomes and will account for a minimum of 10% of the total course grade. The assignment(s) will allow students to demonstrate at least 5 of the 7 General Education program outcomes.

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