

**Miami-Dade Community College Miami-Dade Community College**  
**MAC 1140 Pre-Calculus Algebra**

Course Description

Topics include: Properties and graphs of algebraic, exponential, and logarithmic functions; piecewise-defined functions; the Fundamental Theorem of Algebra; solutions of polynomial equations; conic sections; systems of equations and matrices; arithmetic and geometric sequences and series; the Binomial Theorem; applications and modeling. (3 hrs. lecture)

Pre-requisite: MAC 1105 with a grade of C or better or equivalent

Course Competencies:

Competency 1: The Student will demonstrate knowledge of the polynomial, rational and other algebraic functions, their properties and their graphs by:

- a. Defining the functions.
- b. Identifying the domains and ranges of the functions.
- c. Graphing the functions, and their transformations.
- d. Defining inverse functions.

Competency 2: The Student will demonstrate knowledge of polynomial and rational inequalities by:

- a. Solving linear and nonlinear inequalities.
- b. Graphing linear and no linear I equalities.

Competency 3: The Student will demonstrate knowledge of exponential and logarithmic functions, their properties and their graphs by:

- a. Defining the exponential and logarithmic functions.
- b. Identifying the domains and ranges of the exponential and logarithmic functions.
- c. Graphing the exponential and logarithmic functions, and their transformations.
- d. Evaluating logarithmic expressions.
- e. Solving exponential and logarithmic equations.

Competency 4: The Student will demonstrate knowledge of piecewise defined functions by:

- a. Defining piecewise defined functions.
- b. Identifying the different conic sections.
- c. Graphing piecewise defined functions.

Competency 5: The Student will demonstrate knowledge of conic sections by:

- a. Identifying the different conic sections.
- b. Graphing the different conic sections.

Competency 6: The Student will demonstrate knowledge matrices and determinants by:

- a. Defining matrices and dimensions of matrices.
- b. Performing algebraic operations on matrices.
- c. Evaluating determinants.
- d. Solving linear systems using Cramer's Rule.

Competency 7: The Student will demonstrate knowledge of sequences and series by:

- a. Defining sequences and series (including arithmetic and geometric).
- b. Writing the  $a_n$  term of sequences.
- c. Finding the sums of series (including arithmetic and geometric).

Competency 8: The Student will demonstrate knowledge of mathematical induction by:

- a. Proving that a given formula is the true through the Principle of Mathematical Induction.

Competency 9: The Student will demonstrate knowledge of the Binomial Theorem by:

- a. Expanding a Binomial using the Binomial Theorem.

Competency 10: The Student will demonstrate knowledge of applications of Pre-Calculus by solving problems involving, but not limited to, the following:

- a. Exponential and Logarithmic Growth and Decay Model