

Miami Dade College
MAC 1140 Pre Calculus Algebra

Course Description

This course is primarily designed for students who are majoring in areas that require one or more courses in the calculus sequence. The student will analyze and graph algebraic, exponential, logarithmic, piecewise-defined functions and conic sections. The student will solve polynomial, exponential and logarithmic equations, as well as systems of linear and nonlinear equations. The student will identify arithmetic and geometric sequences and series and solve related problems. The student will use the Binomial Theorem to expand polynomials and solve related problems. The student will use mathematical induction to prove statements regarding the properties of natural numbers. The student will solve applications and modeling problems related to the above topics. (3 hrs. lecture)

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

Course Competencies:

Competency 1: The student will demonstrate an understanding of polynomial functions by

- a. analyzing the graph of a polynomial function, its behavior near its zeros and its end behavior.
- b. using the appropriate theorems of polynomials to factor a polynomial function and find all its zeros.
- c. stating the Fundamental Theorem of Algebra.
- d. using appropriate rules or theorems to determine the existence, location and classification of the zeros of a polynomial function.
- e. using the appropriate theorems of polynomials to build a polynomial function given its zeros or its graph.
- f. graphing polynomial functions.

Competency 2: The student will explore other algebraic functions by

- a. graphing transformations of a function given its graph or its equation.
- b. graphing piecewise functions that include nonlinear pieces.
- c. constructing and graphing functions that model real life applications and solving related problems.

Competency 3: The student will demonstrate an understanding of the conic sections by

- a. identifying them as the result of intersecting a plane with a cone.
- b. writing an equation for a parabola, ellipse or hyperbola in standard form given sufficient information about the conic.
- c. graphing a parabola, ellipse or hyperbola in standard form given sufficient information about the conic or given its equation.
- d. solving application problems involving parabolas, ellipses, and hyperbolas.

Competency 4: The student will demonstrate an understanding of sequences and series by

- a. defining sequences by using the general term or a recursive formula.
- b. classifying sequences as arithmetic, geometric or neither.
- c. adding the first n terms of a geometric or arithmetic sequence.
- d. using the summation notation properties to express and evaluate sums.
- e. finding the sum of a geometric series if it exists.
- f. proving a given statement is true using the principle of mathematical induction.
- g. solving application problems involving sequences.

Competency 5: The student will apply the Binomial Theorem

- a. to expand powers of a binomial.
- b. to find a particular coefficient or term.

Competency 6: The student will demonstrate an understanding of systems of equations by

- a. solving systems of three or more linear equations using matrices.
- b. solving systems of two nonlinear equations with two variables graphically and/or algebraically.

Competency 7: The student will demonstrate an understanding of exponential and logarithmic functions by

- a. identifying the domain of logarithmic and exponential functions.
- b. graphing logarithmic and exponential functions using transformations.
- c. solving equations involving logarithmic and exponential functions.
- d. using mathematical modeling to solve applications of logarithmic and exponential functions.

Competency 8: The student will demonstrate an understanding of rational functions by

- a. graphing rational functions which have asymptotes including vertical, horizontal and oblique.
- b. analyzing the behavior of the graph of a rational function about a point of discontinuity.
- c. analyzing the end behavior of the graph of a rational function in which the degree of the numerator is greater than the degree of the denominator plus one.