Miami Dade College

Course Description
MAC1140 | Pre-Calculus Algebra | 3.00 credits

This course will cover 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, matrices, and determinants, arithmetic and geometric sequences and series, the binomial theorem, and corresponding applications and modeling. Computational course.

Course Competencies

Competency 1: The student will demonstrate knowledge of piecewise-defined functions by:
1. Graphing advanced piecewise-defined functions

Competency 2: The student will demonstrate knowledge of exponential and logarithmic functions, their properties, and their graphs by:
1. Defining the exponential and logarithmic functions and their inverse relationship
2. Evaluating exponential and logarithmic expressions
3. Graphing the exponential and logarithmic functions with and without transformations
4. Identifying the domain and range of an exponential or logarithmic function
5. Applying properties of logarithms to expand and condense logarithmic expressions
6. Solving exponential and logarithmic equations
7. Applying modeling techniques to solve problems of exponential growth and decay

Competency 3: The student will demonstrate knowledge of polynomial functions by:
1. Analyzing the graph of a polynomial function, its behavior near its zeros, and its end behavior
2. Stating the Fundamental Theorem of Algebra
3. Using appropriate rules or theorems to determine the existence, multiplicity, location, and classification of real and complex zeros of a polynomial function
4. Sketching the graph of a polynomial function
5. Building a polynomial function given its zeros and their multiplicity or its graph

Competency 4: The student will demonstrate knowledge of rational functions by:
1. Finding vertical, horizontal, and oblique asymptotes
2. Determining the domain of rational functions
3. Graphing rational functions
4. Analyzing the behavior of a rational function near the point of discontinuity and the end behavior

Competency 5: The student will demonstrate knowledge of polynomial and rational equations and inequalities by:
1. Solving systems of non-linear equations
2. Solving linear and non-linear inequalities
3. Graphing their solution set

Competency 6: The student will demonstrate knowledge of conic sections by:
1. Identifying conic sections as the result of intersecting a plane with a con
2. Identifying and graphing the different conic sections
3. Writing an equation for a conic in standard or general form, where applicable, by identifying the corresponding parts of the conic
4. Solving application problems involving parabolas, ellipses, and hyperbolas

Competency 7: The student will demonstrate knowledge of matrices and determinants by:

1. Defining matrices and dimensions of matrices
2. Performing algebraic operations on matrices
3. Evaluating determinants
4. Solving linear systems using matrices and determinants
5. Identifying consistent and inconsistent systems

Competency 8: The student will demonstrate knowledge of sequences and series by:
1. Defining sequences and series (including arithmetic and geometric)
2. Writing the term of sequences
3. Finding the sums of series (including arithmetic and geometric)
4. Defining sequences by using the general term or a recursive formula
5. Using the summation notation properties to express and evaluate sums

Competency 9: The student will demonstrate knowledge of mathematical induction by:
1. Proving that a given formula is true through the Principle of Mathematical Induction

Competency 10: The student will demonstrate knowledge of the Binomial Theorem by:
1. Expanding a binomial using the Binomial Theorem
2. Finding the nth term of a binomial sequence

Learning Outcomes:
- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information