Miami Dade College

Course Description
MAC1106 | Integrated College and Precalculus Algebra | 5.00 credits
The student will learn to analyze linear, quadratic, polynomial, rational, radical, absolute value, composite, inverse, piecewise, exponential, and logarithmic functions, conic sections, systems of equations/inequalities, matrices and determinants, sequences & series, the binomial theorem, and applications of mathematical modeling including exponential growth and decay. Computational course.

Course Competencies;
Competency 1: The student will demonstrate knowledge of absolute value equations and inequalities by:
1. Solving absolute value equations.
2. Solving absolute value inequalities.

Competency 2: The student will demonstrate knowledge of complex numbers by:
1. Simplifying radicals with negative radicands by using the definition of i.
2. Simplifying powers of i.
3. Adding, subtracting, multiplying, and dividing complex numbers.

Competency 3: The student will demonstrate knowledge of complex numbers by:
1. Distinguishing if a given relation is a function.
2. Evaluating and using functional notation.
3. Using the vertical line test to determine if a graph represents a function.
4. Identifying and finding the domain and range of relations and functions.
5. Performing operations on functions.
6. Forming function compositions.
7. Finding the inverse of a function.
8. Graphing functions and their inverse.
9. Graphing functions, including absolute value, radical, and power functions using transformations.

Competency 4: The student will demonstrate knowledge of quadratic equations and functions by:
1. Solving quadratic equations and equations quadratic in form using any available method.
2. Using quadratic equations and their solutions to answer modeling questions.
3. Using the discriminant to identify the types of solutions for quadratic equations.
4. Graphing quadratic functions and identifying the vertex, x-intercept, y-intercept, and the axis of symmetry of the graph.
5. Finding the maximum or minimum value of a quadratic function in applications.

Competency 5: The student will demonstrate knowledge of systems of linear and non-linear equations and inequalities by:
1. Solving systems of linear equations in two variables and three variables.
2. Solving systems of non-linear equations.
3. Solving systems of linear and non-linear inequalities.
4. Solving applications and modeling using systems of linear equations and inequalities.

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

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5. Applying modeling techniques to solve.
6. problems of exponential growth and decay.

Competency 7: 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 graph.

Competency 8: 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. Analyze the behavior of a rational function near the point of discontinuity and the end behavior.

Competency 9: The student will demonstrate knowledge of polynomial and rational equations and inequalities by:
1. Solving systems of nonlinear equations.
2. Solving linear and nonlinear inequalities.
3. Graphing their solution set.

Competency 10: The student will demonstrate knowledge of equations in two variables by:
1. Recognizing and graphing equations that represent circles.
2. Writing the equation of the circle given the center and radius.
3. Determining the distance between two points and midpoint coordinates.

Competency 11: The student will demonstrate knowledge of conic sections by:
1. Identifying conic sections as the result of intersecting a plane with a cone.
2. Identifying and graphing the different conic sections.
3. Writing an equation for a conic in a standard or general form, where applicable, by identifying the corresponding parts of the conic.
4. Solving application problems involving parabolas, ellipses, and hyperbolas.

Competency 12: 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. Identify consistent and inconsistent systems.

Competency 13: The student will demonstrate knowledge of sequences and series by:
1. Defining sequences and series (including arithmetic and geometric).
2. Writing a 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 14: The student will demonstrate knowledge of mathematical induction by:
1. Proving that a given formula is valid through the Principle of Mathematical Induction.

Competency 15: 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.

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Learning Outcomes:
- Formulate strategies to locate, evaluate, and apply information
- Use quantitative analytical skills to evaluate and process numerical data
- Communicate effectively using listening, speaking, reading, and writing skills
- Solve problems using critical and creative thinking and scientific reasoning
- Create strategies that can be used to fulfill personal, civic, and social responsibilities