Course Prefix and Number: MDE 61 Credits: 3

Course Title: Learning Supports for Pre-Calculus

Course Description: Provides support to ensure success for students co-enrolled in Pre-Calculus (MTH 161). Course will review foundational topics through direct instruction, guided practice, and individualized support. Co-requisite: MTH 161 – Precalculus I. Lecture 3 hours.

General Course Purpose: This course provides support to ensure student success with the MTH 161 objectives.

Course Prerequisites and Co-requisites:
Co-requisite: MTH 161 – Precalculus I

Student Learning Outcomes:
Upon completing the course, the student will be able to
This course provides support to ensure student success with the MTH 161 objectives, which are:

Relations and Functions
• Distinguish between relations and functions.
• Evaluate functions both numerically and algebraically.
• Determine the domain and range of functions in general, including root and rational functions.
• Perform arithmetic operations on functions, including the composition of functions and the difference quotient.
• Identify and graph linear, absolute value, quadratic, cubic, and square root functions and their transformations.
• Determine and verify inverses of one-to-one functions.

Polynomial and Rational Functions
• Determine the general and standard forms of quadratic functions.
• Use formula and completing the square methods to determine the standard form of a quadratic function.
• Identify intercepts, vertex, and orientation of the parabola and use these to graph quadratic functions.
• Identify zeros (real-valued roots) and complex roots, and determine end behavior of higher order polynomials and graph the polynomial, and graph.
• Determine if a function demonstrates even or odd symmetry.
• Use the Fundamental Theorem of Algebra, Rational Root test, and Linear Factorization Theorem to factor polynomials and determine the zeros over the complex numbers.
• Identify intercepts, end behavior, and asymptotes of rational functions, and graph.
• Solve polynomial and rational inequalities.
• Interpret the algebraic and graphical meaning of equality of functions \( f(x) = g(x) \) and inequality of functions \( f(x) > g(x) \).
• Decompose partial fractions of the form \( \frac{P(x)}{Q(x)} \) where \( Q(x) \) is a product of linear factors.
Exponential and Logarithmic Functions
- Identify and graph exponential and logarithmic functions and their transformations.
- Use properties of logarithms to simplify and expand logarithmic expressions.
- Convert between exponential and logarithmic forms and demonstrate an understanding of the relationship between the two forms.
- Solve exponential and logarithmic equations using one-to-one and inverse properties.
- Solve application problems involving exponential and logarithmic functions.

Systems of Equations
- Solve three variable linear systems of equations using the Gaussian elimination method.

Note: Students who pass MTH 161 will also receive a passing grade (S) in MDE 61.

Major Topics to Be Included:
Topics focus on student needs and may include:
- Factoring
- Simplifying algebraic expressions
- Solving higher order equations with real and complex roots
- Graphing
- Asymptotic behavior
- Power, polynomial, rational, exponential, and logarithmic functions
- Systems of equations and inequalities
- Inverse functions
- Difference quotient
- Gaussian elimination

Date Created/Updated (Month, Day, and Year): November 15, 2019