NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MDE 61 – LEARNING SUPPORT FOR PRE-CALCULUS (3 CR.)

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. Lecture 3 hours. Total 3 hours per week.

General Course Purpose

This course provides support to ensure student success with the MTH 161 objectives.

Course Prerequisites/Corequisites

Prerequisite: MTH 161 with MDE 61 is any six MTE units 1-9, MDE 60, or other placement methods.

Course Objectives

- 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 $P(x)/Q(x)$ 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.

Major Topics to be Included

- 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