**J. Sargeant Reynolds Community College**
**Course Content Summary**

**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 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:
a. Factoring
b. Simplifying algebraic expressions
c. Solving higher order equations with real and complex roots
d. Graphing
e. Asymptotic behavior
f. Power, polynomial, rational, exponential, and logarithmic functions
g. Systems of equations and inequalities
h. Inverse functions
i. Difference quotient
j. Gaussian elimination

**Effective Date/Updated:** November 15, 2019