MDE 61 Course Outline

MDE 61* - Learning Support for Pre-Calculus (3 CR)
Corequisite(s): MTH 161*
Course Type: Developmental
Description: Provides support to ensure success for students co-enrolled in Pre-Calculus I (MTH 161*). Course will review foundational topics through direct instruction, guided practice, and individualized support. Lecture 3 hours per week.

Math Objectives:

Evaluate numeric expressions using order of operations

Perform operations on fractions and simplify
- Add/subtract two fractions by obtaining a common denominator
- Multiply/divide two fractions
- Simplify complex fractions by multiplying by the reciprocal of the denominator

Solve multi-step equations by isolate the variable
- Perform operations on both sides of an equation
- Eliminate fractions from an equation by multiplying by common denominator
- Solve Quadratic equations by taking the square root

Solve equations by other methods (factor, complete the square) when isolate the variable is not an option

Perform operations (+, -,*,/) on polynomial expressions including distributive property, extended distributive property, and squaring.

Factor polynomials including: GCF, trinomials (with LC of 1, prime, composite), 4 terms by grouping, difference of squares

Use completing the square method to rewrite a Quadratic from general form to standard form

Use properties of exponents to simplify algebraic expressions
- Combine exponential expressions with the same base
- Convert between expressions involving negative exponents and fractions

Simplify radical expressions
- Identify the factors of an algebraic expression
- Pull factors outside of radicals

Simplify rational expressions

- Add/subtract two rational expressions by obtaining a common denominator
- Cancel common factors of a rational expression
- Simplify complex fractions by multiplying by the reciprocal of the denominator

Graph lines using input/output tables, intercepts and slope-intercept

- Find the x- and y- intercepts of an equation

Apply transformations, given in standard form, to the parent functions: constant, linear, quadratic, cubic, square root, and absolute value

- Identify and graph the parent function of a transformed function
- Identify vertical and horizontal shifts/scales/reflections of a transformed function
- Apply transformations to graph a transformed function

Graph piecewise, polynomial, rational, exponential and logarithmic functions using any appropriate method

- Determine what to graph on the different portions of the xy-plane for a piecewise-defined function
- Use factors of a polynomial function to determine the zeros of the function
- Identify how the graph of a polynomial function will behave at each x-intercept based on the multiplicity of the zero
- Determine the end behavior of a polynomial function based on its leading term
- Find the vertical, horizontal/slant asymptotes of a rational function
- Determine how the graph approaches each asymptote of a rational function
- Find the intersection between a rational function and its horizontal/slant asymptote

Find all the real zeros of a polynomial by factoring and rational zeros test

Academic Success Skills Objectives:

Practice learning skills used before, during and after class, including specific skills for test preparation, such as test taking strategies and analyzing tests/feedback

Read, comprehend and communicate mathematically

Demonstrate a knowledge of the value of Growth Mindset and Productive Struggle

Time management:

Self-regulated learning
Anti-procrastination skills
TED talk
Aware of commitments
Estimating time required accurately
Knowing how much time outside of class

Optional Learning Activities:

Community building activities
Learning skills
Calendar building

Suggested Formative/Alternative Assessments:

“Pre-Test” to the credit test about 1 week ahead to give feedback
Test Error Analysis or Corrections
Weekly Quizzes or other Assignment to check understanding

Students tend to struggle with:

Basic solving
Fractions
Simplifying radicals
Factoring
Complete the square
Multiplying/squaring polynomials
Distributing negative
Subtracting polynomial
PEMDAS
Simplifying rationals
Math vocab: terms, factor, coefficients, undefined…
Properties of Exponents
Basic graphing (input/output tables, intercepts, coordinates, y=mx+b)

Students could use more time with:

Standard form and transformations
Solving - isolate versus factor
Piecewise Functions
Long division (practice, organization, details
Rational Zeros Test
Graphing Rationals

ADA Statement (PDF)
Title IX Statement (PDF)