

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

Course Prefix and Number: MTH 161

Credits: 3

Course Title: Precalculus I

Course Description: Presents topics in power, polynomial, rational, exponential, and logarithmic functions, and systems of equations. Replaces MTH 163. Credit will not be awarded for both MTH 161 and 167 or equivalent. Prerequisite: Competency in MTE 1-9 as demonstrated through placement or unit completion or equivalent or co-requisite MCR 6. Lecture 3 hours.

General Course Purpose: Students preparing for the fields of business, science, technology, engineering, and mathematics with the intent to pursue further coursework in calculus and beyond will benefit from this course.

Course Prerequisites and Co-requisites:

Prerequisite: Competency in MTE 1-9 as demonstrated through placement or unit completion or equivalent or co-requisite MCR 6.

Student Learning Outcomes:

Upon completing the course, the student will be able to

1. Demonstrate use of relations and functions
 - a. Distinguish between relations and functions
 - b. Evaluate functions both numerically and algebraically
 - c. Determine the domain and range of functions in general, including root and rational functions
 - d. Perform arithmetic operations on functions, including the composition of functions and the difference quotient
 - e. Identify and graph linear, absolute value, quadratic, cubic, and square root functions and their transformations
 - f. Determine and verify inverses of one-to-one functions
2. Demonstrate use of polynomial and rational functions
 - a. Determine the general and standard forms of quadratic functions
 - b. Use formula and completing the square methods to determine the standard form of a quadratic function
 - c. Identify intercepts, vertex, and orientation of the parabola and use these to graph quadratic functions
 - d. Identify zeros (real-valued roots) and complex roots, and determine end behavior of higher order polynomials and graph the polynomial, and graph
 - e. Determine if a function demonstrates even or odd symmetry
 - f. Use the Fundamental Theorem of Algebra, Rational Root test, and Linear Factorization Theorem to factor polynomials and determine the zeros over the complex numbers
 - g. Identify intercepts, end behavior, and asymptotes of rational functions, and graph
 - h. Solve polynomial and rational inequalities

- i. Interpret the algebraic and graphical meaning of equality of functions [$f(x) = g(x)$] and inequality of functions [$f(x) > g(x)$]
 - j. Decompose partial fractions of the form $P(x)/Q(x)$ where $Q(x)$ is a product of linear factors
3. Demonstrate use of exponential and logarithmic functions
 - a. Identify and graph exponential and logarithmic functions and their transformations
 - b. Use properties of logarithms to simplify and expand logarithmic expressions
 - c. Convert between exponential and logarithmic forms and demonstrate an understanding of the relationship between the two forms
 - d. Solve exponential and logarithmic equations using one-to-one and inverse properties
 - e. Solve application problems involving exponential and logarithmic functions
 4. Demonstrate use of systems of equations
 - a. Solve three variable linear systems of equations using the Gaussian elimination method

Major Topics to Be Included:

1. Relations and Functions
2. Polynomial and Rational Functions
3. Exponential and Logarithmic Functions
4. Systems of Equations

Date Created/Updated (Month, Day, and Year): January 22, 2019