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. Credit will not be awarded for both MTH 161 and 167 or equivalent. This is a Passport and UCGS transfer course. Prerequisite: Completion of MDE 60 followed by co-enrollment in MDE 61 with MTH 161 or placement in MTH 161 or placement in co-requisites MTH 161 and MDE 61. Lecture 3 hours. Total 3 hours per week. 3 credits

General Course Purpose

The general purpose of this one-semester course is to prepare students for a course in statistics or applied calculus sequence by providing them with the necessary competencies in algebra and functions. Precalculus I can also be applied in conjunction with Precalculus II in preparation for a course in calculus with analytic geometry.

Course Prerequisites/Corequisites

Prerequisite: Completion of MDE 60 followed by co-enrollment in MDE 61 with MTH 161 or placement in MTH 161 or placement in co-requisites MTH 161 and MDE 61.

Course Objectives

Upon completing the course, the student will be able to:

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))

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 and Inequalities

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

Major Topics to be Included

- Relations and Functions
- Polynomial and Rational Functions
- Exponential and Logarithmic Functions
- Systems of Equations and Inequalities

Effective Date/Updated: August 1, 2022