MTH 161 - PreCalculus I

Course Description

Effective: 2019-08-01

Presents topics in power, polynomial, rational, exponential, and logarithmic functions, and systems of equations and inequalities. Credit will not be awarded for both MTH 161: Precalculus I and MTH 167: Precalculus with Trigonometry or equivalent. This is a Passport Transfer course. 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(s): Competency in MTE 1-9 as demonstrated through placement or unit completion or equivalent or Corequisite: MCR 6: Learning Support for Precalculus I

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

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