

NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MTE 9 – FUNCTIONS, QUADRATIC EQUATIONS AND PARABOLAS (1 CR.)

Course Description

Includes an introduction to functions in ordered pair, graph, and equation form. Also introduces quadratic functions, their properties and their graphs. Credit is not applicable toward graduation. Lecture 1 hour per week

General Course Purpose

The purpose of this course is to develop competency necessary to succeed in selected 100-level math courses in solving applications using functions, quadratic functions and their properties.

Course Prerequisites/Corequisites

Prerequisite: MTE 8

Course Objectives

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

- Determine if a relation is a function and identify the domain and range of the function.
 - Determine if a list of ordered pairs, graph, or equation is a function.
 - Determine the domain and range of a function given as a list of ordered pairs.
 - Determine the domain and range of a function given as a graph.
 - Determine the domain of a function given as an equation.
 - Evaluate $y=f(x)$ for constant values of x and for specific monomials and binomials.
- Find all roots of quadratic equations using both the square root method and the quadratic formula.
 - Find the roots of quadratic equations of the form $ax^2 + c = 0$.
 - Find the roots of quadratic equations of the form $ax^2 + bx + c = 0$ when the discriminant is a positive perfect square, (i.e. the quadratic is factorable).
 - Find the roots of quadratic equations of the form $ax^2 + bx + c = 0$ when the discriminant is positive, but not a perfect square.
 - Find the roots of quadratic equations of the form $ax^2 + bx + c = 0$ when the discriminant is zero.
 - Find the roots of quadratic equations of the form $ax^2 + bx + c = 0$ when the discriminant is negative.
 - Describe the roots of a quadratic based upon the discriminant in all cases.
- Analyze a quadratic function to determine its vertex by completing the square and using the formula.
 - Write a quadratic function in vertex form $y=a(x-h)^2 + k$ by completing the square for quadratics with $a=1$ and identify the vertex (h,k) .
 - Write a quadratic function in vertex form $y=a(x-h)^2 + k$ by completing the square for quadratics with a not equal to 1 and identify the vertex (h,k) .
 - Find the vertex of a quadratic equation $y=ax^2 + bx + c$ using the formula method supplied.
- Graph a quadratic function, using the vertex form, indicating the intercepts and vertex.
 - Determine whether the parabola opens upward or downward.
 - Plot the vertex of the parabola.
 - Determine the axis of symmetry for the parabola.
 - Plot the x-intercepts of the parabola, if they exist.
 - Plot the y-intercept of the parabola and complete the graph with additional points as needed.
- Apply knowledge of quadratic functions to solve application problems from geometry, economics, applied physics, and other disciplines.
 - Solve problems involving area optimization.

- Solve problems involving revenue optimization.
- Solve problems involving the motion of falling objects.

Major Topics to be Included

- a) Determine if a relation is a function and identify the domain and range of the function.
- b) Find all roots of quadratic equations using both the square root method and the quadratic formula.
- c) Analyze a quadratic function to determine its vertex by completing the square and using the formula.
- d) Graph a quadratic function, using the vertex form, indicating the intercepts and vertex.
- e) Apply knowledge of quadratic functions to solve application problems from geometry, economics, applied physics, and other disciplines.