

HOSTOS COMMUNITY COLLEGE  
DEPARTMENT OF MATHEMATICS

**Math 150**                      **College Algebra with Trigonometric Functions**

**CREDIT HOURS:**     4.0

**EQUATED HOURS:** 4.0

**CLASS HOURS:**     4.0

**PREREQUISITE:**     Placement via the CUNY's Proficiency Index for Elementary Algebra

**REQUIRED TEXT:**

The College Algebra Book, Terence Brenner, Daniel Maysonet, Pearson Custom Mathematics, Pearson Learning Solutions 2020

**COURSE DESCRIPTION:**

This course introduces the concept of mathematical functions in preparation for further studies in pre-calculus and calculus. The course content includes an in-depth treatment of the following topics: polynomial functions and factoring techniques, rational functions and equations, radical functions and equations, complex numbers, quadratic equations, graphs of quadratic functions, applications to geometry, conic sections and an introduction to the study of trigonometric functions. This course is appropriate for liberal arts students as well as STEM majors.

**Math 150 Student Learning Outcomes:**

1. Interpret and draw appropriate inferences about functions, conic sections and their properties from quantitative representations such as graphs of basic algebraic functions and graphical representation of conic sections.
2. Use algebraic, numerical and graphical methods to solve mathematical problems including representing functions as graphs and graphical representations of complex numbers and conic sections.
3. Represent quantitative problems expressed in natural language in suitable algebraic, functional and graphical form.
4. Effectively communicate solutions to mathematical problems in written, graphical or equation form.
5. Evaluate solutions to problems and verify the validity of graphs of functions and conics properties for reasonableness by inspection.
6. Apply mathematical methods to problems in other fields of study such as Basic Engineering, Physics and Geometry

**EXAMINATIONS:** A minimum of four partial tests (suggested 15% each) and a comprehensive departmental final examination (suggested 40%)

**GRADES:** A, A<sup>-</sup>, B<sup>+</sup>, B, B<sup>-</sup>, C<sup>+</sup>, C, D, I, F.

**LEARNING OUTCOMES ASSESSMENT TOOLS:**

SLO#1:

- Unit Test #3: Differentiate between functions and relations, determine symmetry, locate asymptotes and perform reflections and translations of graphs of functions.
- Unit Test #4 Inferences relating the graphs of conic sections with properties such as foci, vertices, symmetry and center.
- Departmental Final Exam: Cumulative

SLO#2:

- Unit Test #1: Represent complex numbers graphically
- Unit Test #3: Use algebraic and numerical methods to determine the inverse of a function. Find the composition of functions. Verify inverses by composition and by reflection. Determine the graph of a function through use of translations and reflections. Utilize a table of values for polynomial, rational, and radical functions.
- Unit Test #4: Construct graphs of conic sections. Determine a table of values for a trigonometric function.
- Departmental Final Exam: Cumulative

SLO#3:

- Unit Test #3: Translate word problems involving modeling with functions
- Unit Test #4: Translate conic section properties expressed in natural language into correct graphical representations. Convert word problems into appropriate trigonometric functions.
- Departmental Final Exam: Cumulative

SLO#4:

- Unit Test #2: Communicate solutions to rational, radical and complex number problems in accurate and appropriate form.
- Unit Test #3: Express solutions to problems using appropriate written, graphical or functional methods.
- Unit Test #4: Solve application problems involving Free Falling Objects, Projectiles, Pythagorean Theorem and Area and Volume Problems. : State solutions to trigonometric problems using appropriate properties or table of values.
- Departmental Final Exam: Cumulative

SLO#5:

- Unit Test #3: Use the vertical and horizontal line tests to examine graphs to determine if they represent functions or relations.

- Unit Test #4: Use graphical representation of conic sections to verify their defining properties such as foci, radii, vertices, asymptotes, etc. Express trigonometric values in appropriate units. Inspect trigonometric functions for appropriate domains and ranges.
- Departmental Final Exam: Cumulative

SLO#6:

- Unit Test #3: Use functions to model business applications.
- Unit Test #4: Apply quadratic equations to solve applications in Physics and Right Triangle Geometry. Apply trigonometry to problems in Physics.
- Departmental Final Exam: Cumulative

## COURSE OUTLINE

CLASS #	TOPICS
	<b>Chapter1. FACTORING</b>
1	FACTORING REVIEW: Greatest Common Factor, Difference of Two Squares, Factoring Trinomials, Factoring the difference and sums of cubes, Prime factorization, Solving Quadratic Equations by Factoring
	<b>Chapter 2. RATIONAL EXPRESSIONS &amp; EQUATIONS</b>
2	Rational Expressions: Definition, Domains, Simplifying
3	Multiplication and Division of rational expressions
4	Addition and Subtraction of Rational Expressions: Least Common Denominator
5	Simplifying Complex Rational Expressions
6	Solving Rational Equations That reduce to Either Linear Equations or Quadratic Equations That Can Be Solved by Factoring
7	Word Problems Involving Rational Expressions
8	<b>Review For Exam 1</b>
9	<b>Exam 1 (Suggested 15%)</b>

### Chapter 3. RATIONAL EXPONENTS AND RADICALS

- 10 Radical Expressions: Definition of a Root, Principal Roots, Finding Real Roots of Perfect Powers
- 11 Simplifying Radical Expressions: Monomial Radicands and the Product Rule, Rational Radicands and the Quotient Rule
- 12 Operations on Radicals with the Same Index: Addition, Subtraction, Multiplication and Division
- 13 Multiplication and Division of Radical Expressions, Rationalizing Denominators
- 14 Solving Radical Equations That Reduce to Either Linear Equations or Quadratic Equations That Can Be Solved by Factoring, Applications of the Pythagorean Theorem
- 15 Rational Exponents, Multiplication and Division of Radicals with Different Indices
- 16 Complex Numbers: The Imaginary Unit  $i$ , Pure Imaginary Numbers, Powers of  $i$ , Square Roots of Monomials Revisited
- 17 Operations on Pure Imaginary Numbers, Solving Basic Complex Equations
- 18 Operations on Complex Numbers, Graphical Representation of Complex Numbers
- 19 **Review for Exam 2**
- 20 **Exam 2 (Suggested 15%)**

#### **Chapter 4. QUADRATIC EQUATION**

- 21 Quadratic Equations: Solving by Factoring, Solving Using the Square Root Property
- 22 Solving Quadratic Equations by Completing the Square
- 23 The Quadratic Formula, The Discriminant and the Nature of the Roots of a Quadratic Equation
- 24 Properties of the Roots of a Quadratic Equation, determining a Quadratic Equation Given Its Roots
- 25 Applications: Number Relations, Free Falling Objects, Projectiles, Pythagorean Theorem, Area Problems

## **Chapter 6. FUNCTIONS**

- 26 Concept of a Function: Domain, Range, Vertical Line Test, Using Function Notation
- 27 Graphing Functions From Equations and Tables of Data
- 28 Algebraic Operations on Functions and Compositions of Functions
- 29 Inverses of Functions

## **Chapter 7. INTRODUCTION TO TRIGONOMETRY**

- 30 **EXAM 3 (Suggested 15%)**
- 31 Introduction to Trigonometry: Defining Angles, Degree Measure, Types of Angles, Relationships Between Angles
- 32 Radian Measure, Arc Length, Area of a Circular Sector, Conversion Between Degrees and Radians
- 33 Similar Triangles and Applications
- 34 Right Triangle Trigonometry, Trigonometric Functions of  $30^\circ$ ,  $45^\circ$  and  $60^\circ$
- 35 Solving Right Triangles and Applications:  
**Review For Exam 3**

## **Chapter 8 CONIC SECTIONS**

- 37 Conic Sections: The Distance Formula and the Circle, Center and Radius, Standard Form, Sketching the Graph
- 38 The Parabola: Definition, Concavity, Intercepts the Vertex Axis of Symmetry, Standard Form, Sketching the Graph
- 39 The Ellipse: definition, Standard Form Sketching the Graph
- 40 The Hyperbola: Definition, Asymptotes, Standard Form, Sketching the Graph
- 41 Solving Systems of Equations in Two Variables Consisting of a Linear Equation and a Quadratic Equation: **Review for Exam 3**

**Exam 4 (Suggested 15%)**

**42 FINAL EXAM 9 (Suggested 40%)**