HOSTOS COMMUNITY COLLEGE
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

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, second edition, 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

Pathways Learning Outcomes:

Mathematical and Quantitative Reasoning:

MAT 150 will meet all the following Pathways Learning Outcomes from "Mathematical and Quantitative Reasoning". A student will:

1. Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.

2. Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.

3. Represent quantitative problems expressed in natural language in a suitable mathematical format.

4. Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.

5. Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.

6. Apply mathematical methods to problems in other fields of study.

Student Learning Outcomes**	**Mathematical and Quantitative Reasoning Outcomes****	**Assessments and topics*****
SLO 1	MQR 1	Test#1,and Final
SLO 2	MQR 2	Test#1,2,3,and Final
SLO 3	MQR 3	Test#1,and Final
SLO 4	MQR 4	Test#3,and Final
SLO 5	MQR 5	Test#4,and Final
SLO 6	MQR 6	Test#1,and Final

** Please see above for the list of SLO and MQR Outcomes
*** Please see blow for the list of topics that will be assessed in each unit test and final exam

SLO#1, MQR#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, MQR#2:

- 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 #1: Represent complex numbers graphically
- Unit Test #4: Construct graphs of conic sections. Determine a table of values for a trigonometric function.
- Departmental Final Exam: Cumulative

SLO#3, MQR#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, MQR#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, MQR#5

- 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#6, MQR#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

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

GRADES: A, A^-, B^+, B, B^-, C^+, C, D, I, F.

COURSE OUTLINE

CLASS#	TOPICS
	Chapter1. FACTORING
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
	Chapter 2. RATIONAL EXPRESSSIONS & EQUATIONS
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	**Review For Exam 1**
9	**Exam 1 (Suggested 15%)**

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 or *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 TRIGONOMETYRY

30 **EXAM 3 (Suggested 15%)**

31 Introduction to Trigonometery: Defining Angles, Degree Measure, Types of Angles, Relationships Between Angles

32 Radian Measure, Arc Length, Are of a Circular Sector,

33 Conversion Between Degrees and Radians

Similar Triangles and Applications

34 Right Triangle Trigonometry, Trigonometric Functions of 30^0, 45^0 and 60^0

35 Solving Right Triangles and Applications:
Review For Exam 3

36

Chapter 8 CONIC SECTIONS

37 Conic Sections: The Distance Formula an 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%)