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: Passing M1 & M2 OR Math 20 OR placement via the CUNY Common Departmental Final

REQUIRED TEXT:

College Algebra, Terence Brenner, Daniel Maysonet, Pearson Custom Mathematics, Pearson Learning Solutions 2014

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^-, B^+, B, B^-, C^+, C, D, I, F.

LEARNING OUTCOMES ASSESSMENT TOOLS:

SLO#1:

- Unit Test #1: Differentiate between functions and relations, determine symmetry, locate asymptotes and perform reflections and translations of graphs of functions.
- Unit Test #3 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: 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 #2: Represent complex numbers graphically
- Unit Test #3: Construct graphs of conic sections.
- Unit Test #4: Determine a table of values for a trigonometric function.
- Departmental Final Exam: Cumulative

SLO#3:

- Unit Test #1: Translate word problems involving modeling with functions
- Unit Test #3: Translate conic section properties expressed in natural language into correct graphical representations.
- Unit Test #4: Convert word problems into appropriate trigonometric functions.
- Departmental Final Exam: Cumulative

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SLO#4:

- Unit Test #1: Express solutions to problems using appropriate written, graphical or functional methods.
- Unit Test #2: Communicate solutions to rational, radical and complex number problems in accurate and appropriate form.
- Unit Test #3: Solve application problems involving Free Falling Objects, Projectiles, Pythagorean Theorem and Area and Volume Problems.
- Unit Test #4: State solutions to trigonometric problems using appropriate properties or table of values.
- Departmental Final Exam: Cumulative

SLO#5:

- Unit Test #1: Use the vertical and horizontal line tests to examine graphs to determine if they represent functions or relations.
- Unit Test #3: Use graphical representation of conic sections to verify their defining properties such as foci, radii, vertices, asymptotes, etc.
- Unit Test #4: Express trigonometric values in appropriate units. Inspect trigonometric functions for appropriate domains and ranges.
- Departmental Final Exam: Cumulative

SLO#6:

- Unit Test #1: Use functions to model business applications.
- Unit Test #3: Apply quadratic equations to solve applications in Physics and Right Triangle Geometry.
- Unit Test #4: Apply trigonometry to problems in Physics.
- Departmental Final Exam: Cumulative

COURSE OUTLINE

CLASS #	TOPICS	READING MATERIAL
1	**Concept of a Function:** Domain, Range, Vertical Line Test, Using Function Notation	Pg. 36
2	Graphing Functions From Equations and Tables of Data	Pg.45
3	Algebraic Operations on Functions and Composition of Functions	Pg.96
4	Inverses of Functions	Pg.103
5	**Factoring Review**: Greatest Common Factor, Difference of Two Squares, Factoring Trinomials, Prime Factorization, Solving Quadratic Equations by Factoring	Pg.146 - Pg.178
6	**Rational Expressions**: Definition, Domains, Simplifying	Pg.196
7	Multiplication and Division of Rational Expressions	Pg.198
8	Addition and Subtraction of Rational Expressions: Least Common Denominator	Pg. 204
9	Simplifying Complex Rational Expressions	Pg.211
10	Solving Rational Equations That Reduce to Either Linear Equations or Quadratic Equations That Can Be Solved by Factoring	Pg.218
11	Word Problems Involving Rational Expressions	Pg.223

12	**Review For Exam 1**	
13	**EXAM 1 (Suggested 15%)**	
14	**Radical Expressions**: Definition of a Root, Principal Roots, Finding Real Roots of Perfect Powers	Pg.256
15	Simplifying Radical Expressions: Monomial Radicands and the Product Rule, Rational Radicands and the Quotient Rule	Pg.264
16	Operations on Radicals with the Same Index: Addition, Subtraction, Multiplication and Division	Pg. 265
17	Multiplication and Division of Radical Expressions, Rationalizing Denominators	Pg.270
18	Solving Radical Equations That Reduce to Either Linear Equations or Quadratic Equations That Can Be Solved by Factoring, Applications of the Pythagorean Theorem	Pg.281
19	Rational Exponents, Multiplication and Division of Radicals with Different Indices	Pg.250
20	**Complex Numbers**: the Imaginary Unit ***i***, Pure Imaginary Numbers, Powers of ***i***, Square Roots of Monomials Revisited	Pg.287
21	Operations on Pure Imaginary Numbers, Definition of Complex Numbers, Equivalent Complex Numbers, Solving Basic Complex Equations	Pg.288
22	Operations on Complex Numbers, Graphical Representation of Complex Numbers	Pg.289
23	**Review for Exam 2**	
24	**EXAM 2 (Suggested 15%)**	
25	**Quadratic Equations**: Solving by Factoring, Solving Using the Square Root Property	Pg.320
26	Solving Quadratic Equations by Completing the Square	Pg.321
27	The Quadratic Formula, The Discriminant and the Nature of the Roots of a Quadratic Equation	Pg.327
28	Properties of the Roots of a Quadratic Equation, Determining a Quadratic Equation Given Its Roots	Pg.332

29	Applications: Number Relations, Free Falling Objects, Projectiles, Pythagorean Theorem, Area Problems	Pg.344
30	**Conic Sections**: The Distance Formula and the Circle, Center and Radius, Standard Form, Sketching the Graph	Pg.392
31	The Parabola: Definition, Concavity, Intercepts, the Vertex, Axis of Symmetry, Standard Form, Sketching the Graph	Pg.400
32	The Ellipse: Definition, Standard Form, Sketching the Graph	Pg.411
33	The Hyperbola: Definition, Asymptotes, Standard Form, Sketching the Graph	Pg.420
34	Solving Systems of Equations in Two Variables Consisting of a Linear Equation and a Quadratic Equation; **Review for Exam 3**	Pg.428
35	**EXAM 3 (Suggested 15%)**	
36	**Introduction to Trigonometry**: Defining Angles, Degree Measure, Types of Angles, Relationships Between Angles	Pg.453
37	Radian Measure, Arc Length, Area of a Circular Sector, Conversion Between Degrees and Radians	Pg.459
38	Similar Triangles and Applications	Pg.460
39	Right Triangle Trigonometry, Trigonometric Functions of 30°, 45° and 60°	Pg. 462, Pg. 469
40	Solving Right Triangles and Applications; **Review For Exam 4**	Pg.479
41	**EXAM 4 (Suggested 15%)**	
42	**Review for Final Exam**	

FINAL EXAM (Suggested 40%)