LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
DEPARTMENT OF MATHEMATICS, ENGINEERING AND COMPUTER SCIENCE

MAT 117 – ALGEBRA AND TRIGONOMETRY

7 Lecture Hours (at least 1 hour held in a computer lab), 3 Credits
Prerequisite: MAT095 or placement (If you do not have the prerequisite, you may be removed from the course without notice.)

REQUIRED COURSE MATERIALS:

- All written and video course materials, as well as required homework assignments, are accessed online at https://ohm.lumenlearning.com. The cost for access is $20 purchased online at https://ohm.lumenlearning.com or $25 if you purchase access through the bookstore. You should register for an account and enroll in the course as soon as possible. Your instructor will provide you with the information necessary to enroll.
- Calculator: A scientific calculator is necessary for this course. You will not be allowed to use graphing calculators, calculators which solve equations or simplify radicals, or calculators requiring the use of devices such as phones, tablets, or computers. The following inexpensive calculators are approved for use in MAT117:
  - Casio fx-260 Solar II
  - Staples Black Scientific Calculator
  - TI-30X-A.

  If you are unsure of whether your calculator is acceptable for MAT117, please contact your instructor.

CATALOG DESCRIPTION

This course gives a thorough treatment of college algebra and trigonometry topics: linear, quadratic, rational, exponential and logarithmic expressions/functions as well as basic right-triangle trigonometry and graphical properties of sine and cosine functions. Supporting topics from elementary algebra such as linear modeling, factoring, solving linear systems and quadratic equations, and operations with radical expressions are included. Instructional methods include lecture, group work and computer activities.

PURPOSES AND GOALS

MAT117 is designed to allow students who are placed at the basic skills level and require college algebra to exit developmental mathematics and earn college credit within one semester. There will be strong emphasis on the conceptual aspects of algebra that underlie algebraic procedures. Because research shows that pedagogy is as important as curriculum for student success, instructors will employ a variety of instructional methods (e.g., lecture, guided groupwork, and graded/nongraded formative assessments/feedback).

INSTRUCTIONAL OBJECTIVES:
1. Enable students to improve their accuracy and fluency with the four fundamental arithmetic operations.
2. Introduce students to the concept of function and its application in modeling (linear and exponential cases in particular).
3. Familiarize students with the equivalence between the rate of change of a linear function and the (constant) slope of its graph, enabling students to graph straight line equations.
4. Introduce students to quadratic functions and their graphs, and enable them to find "zeroes" by solving quadratic equations.
5. Familiarize students with the arithmetic of rational expressions, reinforce the algebra required to solve equations involving rational expressions, and introduce rational functions.
6. Familiarize students with the arithmetic of radical expressions and provide them with algebraic methods for solving equations involving radicals.
7. Introduce students to exponential and (via the concept of inverse) logarithmic functions, and their graphs; additionally, provide students with the requisite computational and algebraic skills necessary to solve exponential and logarithmic equations.
8. Introduce students to right-triangle trigonometry, featuring the basic trigonometric ratios; and then familiarize them with the properties of the sine and cosine functions.
9. Enable students to identify and apply appropriate mathematical methods to solve problems in real-world contexts.

PERFORMANCE OBJECTIVES:
1. Add, subtract, multiply, and divide rational and decimal numbers with accuracy and fluency.
2. Explain and describe the functional concept/properties, and compare and contrast linear and exponential data.
3. Describe the equivalence of rate of change and slope for a linear function, and apply it in graphing straight lines.
4. Graph quadratic functions and solve quadratic equations.
5. Carry out arithmetic operations with rational expressions and solve equations involving them.
6. Carry out arithmetic operations with radical expressions and solve equations involving them.
7. Sketch graphs of exponential and logarithmic functions, and solve exponential and logarithmic equations.
8. Solve right-triangle trigonometry problems and sketch the graphs of the sine and cosine functions.
9. Apply mathematical techniques appropriately to solve real-world problems.

Student Learning Objectives: This course fulfills the Pathways common core with the following student learning objectives:
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.

EVALUATION:

The purpose of a grading system is to give students, and those who will read their transcripts, an accurate record of their performance in this course. The role of the Mathematics, Engineering and Computer Science Department is to provide a fair, valid, and reliable structure for assessing student achievement.

CATEGORY	PERCENTAGE
Online Homework	15%
Quizzes	10%
Projects	10%
Instructor's Tests (3 @ 11⅔% each)	35%
Departmental Final Exam	30%

EXPLANATION OF GRADING CATEGORIES

- **Online Homework:** Students will complete one or more online homework assignments for each course topic.
- **Quizzes:** Several short assessments will be administered throughout the semester.
- **Projects:** Your instructor will assign inquiry-learning projects throughout the semester. At least one of these projects should support development of LaGuardia's Inquiry and Problem Solving competency and be deposited to your ePortfolio. Examples of suitable projects may be found at https://www.laguardia.edu/MEC/Student-Resources/Assessments-Activities/#mat117.
- **Instructor's Tests:** Your instructor will develop and administer three tests during the course of the semester.
- **Departmental Final Exam:** This two-hour exam will be given during final examination week. It will be cumulative and cover all topics.

PASSING GRADE POLICY

In order to pass this course, you must have an **average total score of at least 60%** and **no more than 12 hours of unexcused absences**.

If you do not meet the above criteria, you will be assigned an F or WU grade for the course. If, however, your average on practices (homework) designated as basic skills (BSK Homework) is at least 70%, you will be given the opportunity to exit the basic skills portion of this course and enroll in MAT115 next semester. Students who choose to take advantage of this opportunity will take the "MAT115 Eligibility Exam" on Lumen. A grade of 60 or higher on the exam will be required to be placed directly into MAT115. If you then pass MAT115 with a grade of C or higher, the F from MAT117 will not be part of your GPA (pursuant to LaGuardia's F Grade Policy, which may be found in the Academic Requirements and Policies section of the LaGuardia Community College Catalog).

ACADEMIC INTEGRITY

This class will be conducted in compliance with LaGuardia Community College's academic integrity policy. For further information visit https://www.laguardia.edu/uploadedFiles/Main_Site/Content/Faculty_Staff/Docs/academicintegritypolicy.pdf. The complete policy may be found starting on page 74 of the LaGuardia Community College Student Handbook for 2021.

ATTENDANCE

The maximum number of absences will be **12 hours**. Unexcused absences beyond this maximum will result in a grade of **WU** or **F**.

INCOMPLETE GRADE POLICY

Eligibility: The Incomplete grade (IN) is intended for situations which arise that are beyond the student's control. It is reserved for a student in good academic standing (maintaining a passing GPA) and for whom there is reasonable expectation of satisfactory course completion—defined as both satisfactory attendance in the class and having not completed at most two major assignments or examinations by the end of the course.

Restrictions: An IN is not to be initiated by an instructor without the student's consent and is not permitted to replace a failing grade in a course. The IN is agreed to by the student and instructor. A student's strict adherence to attendance and academic policies as outlined above is required, without exception.

ADDITIONAL POLICIES

Additional course policies may be specified at the discretion of the instructor.

COURSE OUTLINE

Week	Hours	Topic	Recommended Text Exercises	Online Block
Week 1	1	Real Number Arithmetic	Absolute Values: All Integers: All Fractions: All	Arithmetic Review
	2	Exponents and Roots Intro	Exponents and Roots: All	
	3	Order of Operations	Order of Operations: All	
	4	Algebraic Expressions	Algebraic Expressions: All	
	5-6	Linear Equations in One Variable	One-Step Equations: All Two-Step Equations: All General Linear Equations: All Equations with Fractions: All Proportions: 1-30	Linear Equations in One Variable
	7	Lab: Course and Lumen Overview		
Week 2	8	Literal Equations	Literal Equations: All	
	9-10	Linear Inequalities in One Variable	Linear Inequalities: All	
	11	Absolute Value Equations	Absolute Value Equations: All	
	12	Absolute Value Inequalities	Absolute Value Inequalities: All	
	13	The Cartesian Coordinate System	Graphing Points and Lines: 1-2	Linear Equations in
	14	Lab: Instructor's Discretion		
Week 3	15-18	Linear Equations in Two Variables and Their Graphs	Graphing Points and Lines: 3-22 Slope: 1-30 Slope-Intercept Form: All Point-Slope Form: All	Linear Equations in

			Parallel Lines: 1-8, 17-24, 33-40	Two Variables and Introduction to Functions
	19	Systems of Linear Equations	Substitution: All Addition/Elimination: All	
	20	Applications of Systems of Equations	Mixture Problems: All	
	21	Lab: Instructor's Discretion		
Week 4	22-24	Relations and Functions Difference Quotient and Average Rate of Change	Intro to Relations: All Functions, Difference Quotient and Average Rate of Change: All	
	25	Linear Models	Linear Models: 9-19	
	26-27	Properties of Integer Exponents	Exponent Properties: All Negative Exponents: All	Exponents and Polynomials
	28	Lab: Instructor's Test 1		
Week 5	29	Properties of Integer Exponents Continued		
	30-31	Polynomials and Polynomial Arithmetic	Intro and Addition: All Multiplication – General: All Special Products: All Division: All	
	32-34	Factoring Polynomials	Greatest Common Factor: All Trinomials where a=1: All Factor by Grouping: 1-22 Trinomials where a is not 1: All Difference of Squares: All Factoring Strategy: 1-18,20-32, 34-42	Factoring
	35	Lab: Instructor's Discretion		
Week 6	36-37	Factoring Polynomials Continued		
	38	Square Root Basics	Square Root Basics: All	
	39-41	Quadratic Equations	Solve by Factoring: All Solve Using Roots: 1,3,5,6,10 Completing the Square: All Quadratic Formula: All	
	42	Lab: Instructor's Discretion		Quadratic Functions
Week 7	43	Quadratic Equations Continued		
	44-45	Quadratic Functions and Their Graphs	Graphs of Quadratics: All	
	46	Quadratic Models	Quadratic Models: 66-75	
	47-48	Arithmetic with Square Root Expressions	Adding Radicals: 1-24 Multiply Radicals: 1-4,7-32 Rationalize Denominators: All	
	49	Lab: Instructor's Discretion		Radical Functions
Week 8	50	The Pythagorean Theorem Distance in the Plane	Pythagorean Theorem & 2D Distance: All	
	51	Roots and Rational Exponents	Rational Exponents: All	
	52	Radical Equations	Equations with Radicals: All	
	53	Domains of Radical and Rational Functions	Rational & Radical Domains: 8-25	Rational Functions

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	54-55	Simplifying and Arithmetic with Rational Expressions	[Evaluate & Reduce](#): All[1] [Multiply and Divide](#): All [Least Common Denominator](#): All [Add and Subtract](#): All	
	56	Lab: Instructor's Test 2		
Week 9	57	Simplifying and Arithmetic with Rational Expressions Continued		
	58-59	Rational Equations	[Solving Rational Equations](#): All	

	60	Exponential Functions and Their Graphs	[Exponential Functions](#):
			    All Algebraic & Numeric
			[Graphs](#): Graphical 1-3 &
			    All Numeric
				Exponential and Logarithmic Functions

	61	Same Base Exponential Equations	[Same-Base Equations](#): All	
	62	Inverse Functions	[Inverse Functions](#): 1-5,7-13,23-40	
	63	Lab: Instructor's Discretion		

Week 10	64	Logarithmic Functions and Their Graphs	[Logarithmic Functions](#):
			    All Algebraic, Numeric,
			    & Technology
			[Graphs](#): Graphical 1-21	

	65-66	Properties of Logarithms	[Logarithmic Properties](#):
			    All Algebraic **except**
			    base change	

	67-68	Exponential and Logarithmic Equations	[Exponential & Logarithmic Equations](#): All Algebraic	
	69	Exponential Models – Compound Interest	[Growth & Decay](#): 1-18 (+ Revisit Compound Interest)	
	70	Lab: Instructor's Discretion		
Week 11	71-72	Angles and Their Measure	[Angles & Their Measure](#): 1-4,6-21,26-39	Trigonometric Functions
	73-75	Right Triangle Trigonometry with Applications	[Right Triangle Trig](#): 1,3,4,10-19,23-25,29-56	
	76	Trigonometric Functions of Any Angle	[Sine & Cosine on Circles](#): 1-3,10-49 [Other Trig Functions](#): 6,10,14,18,22,26,30,34	
	77	Lab: Instructor's Test 3		
Week 12	78-80	Trigonometric Functions of Any Angle Continued		
	81-82	Graphs of Sinusoidal Functions	[Sinusoidal Graphs](#): 6-14	
	83-84	Final Exam Review		
Week 13	85-86	Final Exam		

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[1] In *Evaluate and Reduce Rational Expressions,* frame 7-16 in terms of domain