

**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

MAT117 comprises topics from both elementary and intermediate algebra and enables students requiring remedial MAT096 to earn college credit for MAT115 at the same time. All intermediate algebra topics are treated--polynomial, rational, exponential, logarithmic, and trigonometric expressions/functions in addition to basic right-triangle trigonometry. Rates of change and mathematical modeling are featured when appropriate. Instructional methods include lecture, guided groupwork and instructor feedback.

PURPOSES AND GOALS

MAT117 is designed to allow students who require MAT096 and 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.

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 @ 11 $\frac{2}{3}$ % 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 overall score is at least 40 and you have no more than 12 hours of unexcused absences, you will be given the opportunity to exit from the MAT096 portion of the class. Students who choose to take advantage of this opportunity will enroll in a brief intervention course and take the CUNY Elementary Algebra Final Exam (CEAFE). A grade of 60 or higher on the CEAFE will be required to exit MAT096 and be placed directly into MAT115. If you meet the criteria to exit MAT096 and 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 77 of the LaGuardia Community College Student Handbook for 2018-2019.

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	Integers and Absolute Value: Simplify Expressions with Absolute Value - All Integers: All Fractions: All	Arithmetic Review
	2	Exponents and Roots Intro	Exponents Square Roots Cube Roots	
	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 MyOpenMath Overview			
Week 2	8	Literal Equations	Literal Equations: All	Linear Equations in Two Variables and Introduction to Functions
	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	
	14	Lab: Instructor’s Discretion		
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 Parallel Lines: 1-8, 17-24, 33-40		

	19	Systems of Linear Equations	Substitution : All Addition/Elimination : All	
	20	Applications of Systems of Equations	Mixture Problems : All	
	21	Lab: Instructor's Discretion		
	22-24	Relations and Functions Difference Quotient and Average Rate of Change	Functions and Relations : Problem 3,6,12,19	
	25	Linear Models	Linear Models : 9-19	
	26-27	Properties of Integer Exponents	Exponent Properties : All Negative Exponents : All	
	28	Lab: Instructor's Test 1		
Week 5	29	Properties of Integer Exponents Continued		Exponents and Polynomials
	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		Quadratic Functions
	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		
Week 7	43	Quadratic Equations Continued		Radical Functions
	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		
Week 8	50	The Pythagorean Theorem Distance in the Plane	Pythagorean Theorem Distance : Try It 1, Try It Now 1	Rational Functions
	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	

	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		

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