

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

MAT 115 Syllabus: College Algebra and Trigonometry

Catalog Description: 4 Lecture hours (one hour held in a computer lab) , 3 Credits

Prerequisite: MAT 096, MAT 099 or Placement

This course will start with a review of basic algebra skills such as factoring, solving linear equations and inequalities and proceed to a study of polynomial, exponential, logarithmic, and trigonometric functions. These functions will be used in applications involving simple mathematical modeling where students will engage in inquiry activities aimed at improving critical-thinking skills. A scientific calculator (neither graphical nor programmable) is required. Possible models of calculators: Casio fx-260 Solar II, TI-30X-A or Staples Black Scientific Calculator

Instructional Objectives

During this course, the instructor expects to:

1. To reinforce student's basic algebraic skills.
2. To introduce students to the concept of a function and its application in modeling.
3. To develop students' problem-solving and critical thinking skills through inquiry learning and the use of technological tools.
4. To introduce students to the concepts and properties of quadratic, exponential, and logarithmic functions.
5. To introduce students to basic trigonometry.
6. To introduce students to inquiry and problem solving via linear, quadratic or exponential mathematical modeling.

Performance Objectives:

At the conclusion of this course, students will be able to:

1. To perform operations on polynomials, rational expressions, and radicals; to solve systems of linear equations graphically and algebraically.
2. To understand the concept of a function and its role in mathematical modeling of real-life problems.
3. To interpret and solve elementary word problems using technological tools.

4. To solve problems involving quadratic, exponential and logarithmic functions.
5. To parse and solve right-angle trigonometry problems.
6. To interpret, analyze and develop an appropriate mathematical model based on researched data.

Textbook: The following free OER (Open Education Resource) textbook will be used.

Algebra and Trigonometry - OpenStax - cnx.org
Senior contributing author: Jay Abramson, Arizona State University

Textbook Links:

Web View: <https://cnx.org/contents/E6wQevFf@11.1:nU8Qkzwo@5/Introduction-to-Prerequisites>

This is a free downloadable textbook. Students are encouraged to download the pdf format of the textbook at:

<https://cnx.org/exports/13ac107a-f15f-49d2-97e8-60ab2e3b519c@11.1.pdf/algebra-and-trigonometry-11.1.pdf>

Online access is required for tutorials, homework and quizzes. Students must purchase the access code for the online LUMEN platform. The cost is currently \$20 via online on LUMEN or \$25 though the college’s bookstore.

Lumen Learning OHM website: <https://ohm.lumenlearning.com>

Inquiry Problem Solving Competency: Students enrolled in MAT115 will be expected to deposit at least one inquiry learning project (see below) in his/her ePortfolio. Suitable examples of such projects can be found on the MEC department website at:

<https://www.laguardia.edu/MEC/Student-Resources/Assessments-Activities/#mat117>

Grading:

Instructor’s Tests (2-3) -----	45%
Inquiry Learning Projects-----	13%
Online Quizzes (28)-----	6%
Online Homework (28) -----	6%
Final(Departmental)-----	30%

Final Exam: This is a two-hour online test via LUMEN consisting of 15 questions (10 of them free-response multi-part and the other 5 need work to be shown by writing in the embedded window or uploading a pdf/jpeg file.

Academic Integrity: This class will be conducted in compliance with LaGuardia Community College’s academic integrity policy. (See college catalogue for details)

Sanctions for Academic Integrity Violations: Sanctions or penalties for violations of academic integrity are imposed by the faculty member teaching the course upon discovery of a violation. All cases of academic dishonesty are filed with the College Adjudicator, who maintains a record of academic integrity violations.

The occurrence of a second or third offense of academic dishonesty may involve the imposition of a disciplinary sanction in addition to the academic sanction imposed by the instructor. Sanctions for violations of academic integrity include, but are not limited to, the following: failure of an exam, a grade of F on an essay or research paper, failure of a course project, failure of the course, suspension from the College or dismissal from the College

IN Grade: The Incomplete grade may be awarded to students who have not completed all of the required course work but for whom there is a reasonable expectation of satisfactory completion. A student who is otherwise in good standing in a course – defined as complying with the college attendance policy and maintaining a passing average – but who has not completed at most two major assignments or examinations by the end of the course may request an IN grade. To be eligible a student must provide, before the instructor submits final grade for the course, a documented reason, satisfactory to the instructor, for not having completed the assignments on time. (See catalog for more details).

Attendance Policy: The maximum number of unexcused absences allowed is 15% of the total class meetings (about 7 hours). Unexcused absences beyond this maximum will result in a grade of WU or F.

Department Contact Information:

Office: E-223

Tel#: (718) 482 – 5710

Tutoring (online): Mathematics Learning Center: Schedule to be announced

Lesson	Topic	Section	Page	Suggested supplemental exercises-odd numbered problems
1	Absolute value; solving absolute value equations and inequalities; Homework #1 , #2; Quiz#1 , #2	2.7	Page 142	Page 149: 5, 15, 17, 19, 21 23, 33, 35, 43, 59
2	Graphing linear equations; point-plotting; quadrants; intercepts	2.1	Page 74	Page 84: 1 – 15; 31 - 41
3	Slope: parallel/perpendicular lines; graphs from a chart of values and using slope and y-intercept Homework#3 ; Quiz#3	2.2	Page 93	Page 100: 23 - 33

4	Equation of a line: slope-intercept form; point-slope form, vertical and horizontal lines; parallel/perpendicular lines and conditions on slope Homework#4 , #5 ; Quiz#4, #5	2.2	Page 93	Page 101: 37 - 45
5	Solving systems of linear equations in two variables: graphical method; 3 solution types and graphical equivalents	11.1	Page 876	Page 889: 1 - 9
6	Solving systems of linear equations in two variables: algebraic method; e.g., addition/elimination or substitution Homework#6 ; Quiz#6	11.1	Page 876	Page 889: 11 - 29
7	Solving systems of linear equations in two variables: application/word problems Homework#7 ; Quiz#7	11.1	Page 876	Page 890: 51 - 67
8	Functions and relations; definitions; tabular functions; graphs; vertical line test; counterexamples; piecewise functions Homework#8 ; Quiz#8	3.1	Page 159	Page 176: 1 – 15; 27 – 33 41 – 51; 69 - 73
9	Functions: notation; domain and range; restricted values	3.2	Page 180	Page 193: 7- 21; 27 - 33
10	Difference quotient and average rate of change of a function Homework#9 ; Quiz#9	3.3	Page 196	Page 206: 5 - 15
11,12	Linear modeling: proportions and beyond—linear growth; supply and demand problems	4.2	Page 309	Page 317: 9 - 19
13	Review	*****	*****	Instructor’s Material
14	<i>Test 1</i>	*****	*****	Instructor’s Test
15	Operations (+, -, x, ÷) on polynomials and special products; long division/synthetic division Homework#10 ; Quiz#10	1.4 5.4	Page 41 Page 393	Page 48: 5 – 29 Page 400: 3 – 9; 15 - 21
16	Quadratic functions; factoring trinomials of the form ax^2+bx+c	15	Page 49	Page 56: 5 - 41

17	Solving quadratic equations by factoring; zero property Homework#11 ; Quiz#11	2.5	Page 119	Page 129: 7 - 15
18	Solution by completing the square; square root property Homework#12 , #13 ; Quiz#12 , #13	2.5	Page 119	Page 129: 19 - 31
19	Solution by using the quadratic formula: formula derivation; Applications of quadratic functions-minimum/maximum Homework#14 ; Quiz#14	2.5	Page 119	Page 129: 39 - 43
20	Graphing quadratic functions: vertex and intercepts; condition for opening upward/downward Homework#15 ; Quiz#15	5.1	Page 343	Page 357: 5 - 25
21	Modeling involving quadratic functions; optimization Homework#16 ; Quiz#16	5.1	Page 343	Page 359: 67 - 73
22	<i>Discussion of Inquiry Learning Project 1(addresses Inquiry Problem Solving Competency/writing ability)</i>	*****	*****	Project (e.g., linear, quadratic growth of salary with time, beyond the vertex: consequences of retirement—fixed income; ageism resulting in salary decline)
23	Rational expressions; arithmetic with rational expressions; simplification; rational functions (domain/excluded values) Homework#17 ; Quiz#17	1.6	Page 58	Page 64: 5 - 37
24	Solving equations containing rational expressions;	2.2	Page 89	Page 100: 5 - 21
25	Rational exponents; rational roots Homework#18 ; Quiz#18	1.3	Page 37	Page 40: 59 - 67
26	Solving equations with radicals Homework#19 ; Quiz#19	2.6	Page 133	Page 141: 21 - 27
27	Review	*****	*****	Instructor's Material
28	Test 2	*****	*****	Instructor's Test
29	Inverse functions: one-to-one function; horizontal line rule condition; finding inverses (linear and suitable odd power functions; rational functions where numerator and denominator are linear) Homework#20 ; Quiz#20	3.7 5.7	Page 254 Page 435	Page 264: 1 – 11; 23 – 33 Page 444: 17 - 27

30	Exponential functions and their graphs; positive/negative exponents Homework#21 ; Quiz#21	6.1	Page 464	Page 476: 15 ,17,23 and 25
31	Modeling with exponential functions: calibrating exponential functions given (two-point) data	6.1	Page 464	Page 476: 19,21
32	Meaning of the logarithm; (inverse) relation to exponential function Homework#22 ; Quiz#22	6.3	Page 491	Page 497: 1 - 53
33	Properties of logarithms: reducing and expanding logarithmic expression	6.5	Page 516	Page 525: 1 - 31
34	Solving exponential equations: same and different bases Homework#23 ; Quiz#23	6.6	Page 526	Page 535: 5 - 21
35	Solving logarithmic equations Homework#23 ; Quiz#23 (cont'd)	6.6	Page 526	Page 535: 31 - 49
36,37	Modeling with exponential functions: compound interest	6.1	Page 464	Page 476: 31,35,67
38	<i>Discussion of Inquiry Learning Project 2(addresses Inquiry Problem Solving Competency/writing ability)</i>	*****	*****	Project (e.g., linear, quadratic growth of salary with time, beyond the vertex: consequences of retirement—fixed income; ageism resulting in salary decline, exponential growth as a function of time, projected values, maximum domain of the model)
39	Review	*****	*****	Instructor's Material
40	<i>Test 3</i>			Instructor's Test
41,42	Angles: unit circle and measurement (degrees/radians) Homework#24 , #27 ; Quiz#24, #27	7.1 7.3	Page 576 Page 604	Page 591: 1 ,3,7 – 21, 27 - 39
43	Trigonometric functions: definition of six basic ratios; 45-45-90 and 30-60-90 right triangles; evaluation; Pythagorean identities	7.2	Page 583	Page 601: 1 - 31
44	Right-triangle trigonometry: solving triangles Homework#25 ; Quiz#25	7.2	Page 583	Page 602: 33 - 45

45	Right-triangle trigonometry: applications (angle of elevation and angle of depression) Homework#26 ; Quiz#26	7.2	Page 583	Page 603: 47 - 55
46,47	Graphs of the sine and cosine functions: amplitude and period Homework#28 ; Quiz#28	8.1	Page 642	Page 656: 7 - 13
48	Review for Final Exam	*****	*****	Departmental Review
	Cumulative Departmental Final (15 questions - 2 hours)			Given during Week of Finals

Revised **9/3/2020**