**College Algebra & Trigonometry**

**Mr. Blatter**

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**College In The High School Course: SUNY Ulster Full-Year 2021/2022**

## Course Title: MAT-115-45 College Algebra and Trigonometry

**Credit Hours:** 4.0

**Department: STEM(Science, Technology, Engineering, and Mathematics)**

**Text:**  Algebra & Trigonometry, Michael Sullivan, 8th Ed. (ISBN 978-0321716569)

**Objectives:**  Students will be able graph and analyze functions.

Solve quadratics, inequalities, logarithmic equations, radical equations.

Evaluate trigonometric functions without a calculator.

**Prerequisites:** Every student in this course is required to have successfully completed MAT 100 with a grade of C or higher, or the high school equivalent.

**Course Description:** Topics in mathematics preparatory to Precalculus (MAT 160) are covered in this course. Students study linear and quadratic equations; absolute value and polynomial inequalities; coordinate geometry of the line and circle; linear and polynomial functions; techniques of graphing; exponential functions; logarithms; right triangle trigonometry; trigonometric functions of any angle; and fundamental trigonometric identities.

This course covers parts of the following chapters:

Review Chapter

Chapter 1: Equations and Inequalities

Chapter 2: Graphs

Chapter 3: Functions and Their Graphs (sections 3.1-3.5)

Chapter 4: Linear and Quadratic Functions (4.1, 4.3)

Chapter 5: Polynomial and Rational Functions (5.1, 5.3) Chapter 6: Exponential and Logarithmic Functions (6.1-6.7)

Chapter 7: Trigonometric Functions (7.1-7.6)

**Grade:** Your quarter grades will be determined by the following:

1. Homework **5%**
2. Quizzes, Tests & Projects **20%**
3. Unit Tests (1 per quarter) **75%**

**Final grade** will be calculated using:

1. The average of your four quarter grades **80%**

2. Final exam **20%**

Final grades are assigned according to the departmental grade scale.

**Grade Scale: 93 - 100 : A 73 - 76 : C**

**90 - 92 : A- 70 - 72 : C-**

**87 - 89 : B+ 67 - 69 : D+**

**83 - 86 : B 63 - 66 : D**

**80 - 82 : B- 60 - 62 : D-**

1. **- 79 : C+ 0 - 59 : F**

\*A grade of C or higher is required to take MAT 160 (Precalculus).

**Attendance:** Students are expected to attend all classes. Absence does not excuse the student from responsibility for class work or as­signments missed. If you are absent from class it is **your responsibility** to get class notes and make up any homework, tests or quizzes that you missed. Assignments must be made up within **two class days** of your absence, unless it is a long-term situation.

**Materials:** Being prepared for class is one of the most important factors for success. For this class, you will need to have the following things everyday unless specified otherwise:

1. A sharpened pencil or a pen.
2. A three ring binder for notes and assignments. Your notebook should be kept in chronological order and separated into three sections. The first section will be for class notes, the second for homework, and the third for tests and quizzes.
3. Textbook
4. A **graphing calculator** is recommended (TI 84+).There are apps available for your phone. If you have a Galaxy check out Wabbitemu. For Iphone users there is Graphing Calculator X84.

**Homework Policy:**

1. **All problems must be attempted** and all work must be shown as demonstrated in class.
2. Unless absent, **homework will not be accepted late**.
3. Homework points will be disbursed as follows:

0=not turned in, incomplete, or late

1=incomplete or not corrected

2=complete and corrected.

**Quizzes:** Several days a week we will take a 5-minute warm-up quiz. This is a basic knowledge quiz that will cover work that we have already gone over in class. It is a timed quiz! It is important that you pick up a quiz sheet as you enter the room and be prepared to start at the beginning of the period.

**Tests:** You will have a test at the end of specific units. Tests will be announced with plenty of time to prepare. If you are absent the day of a test you will take the test the day you return unless there is an extended period of absence. **You cannot re-take tests to improve your grade**.

**Final Exam:** You will take the SUNY Ulster department final for MAT 115. The exam will be given in class at the end of the school year.

**Extra Help:** Extra help will be available Wednesdays beginning September 16th. Please look for announcements in Google Classroom.

**Statement on Academic Integrity:** Academic integrity is considered to be a serious matter. Any student who does not comply with the rules will be disciplined. The rules would include:

Cheating on exams or quizzes.

Submission of work that is not your own.

Theft or sale of examinations or falsification of academic records.

## Class Rules

## Students are expected to follow their schedule during Synchronous Instruction.

## Students will receive an email notification to join specific teacher's google classrooms.

## Senior High Students will sign into their classes using the Google Meet code associated with the class period. (Study Halls will not have codes)

## Students should have a quiet and appropriate workspace(i.e. kitchen table, desk, location with minimal distractions)

## Microphone muted unless contributing to the conversation

## Online conduct is appropriate and respectful

## Strive for Appropriate Attire/Ready for School

## **Prepared with Essential Supplies Pencil, Pen Notebooks etc...**

* **Established Internet Connection(Contact Building Principal if this is an issue)**

1. Students are responsible for arriving in class on time and remaining in class for the entire period. Arriving late or leaving early is disruptive to the instructor and other stu­dents.

2. Students are responsible for complying with attendance requirements. Excessive absences contribute to poor stu­dent performance. If a student misses class, the student is responsible for lecture material, assignments, and hand­outs for the missed class or classes.

3. Classroom behavior should not interfere with the learn­ing process. Inappropriate behavior during class includes not being respectful of the instructor and other students by leaving one’s seat, carrying on conversation with other students, using a cell phone in class, having a pager sound, and using foul language.

4. Students should come to class prepared. They should have the required textbooks and completed assignments, be pre­pared for exams and quizzes, and be prepared for active participation in class discussions where appropriate. Failure to prepare adequately not only puts students in jeopardy in regard to successful completion of the course, but also affects the progress of the entire class.

**TIPS FOR STUDYING:** The main characteristic of the College Algebra course is the fact that all the topics are linked to each other, so that every newly introduced concept is built upon old ones. The most common reason for difficulty in this course is failure to study consistently. ***You must study this course every day***. You are developing a skill; no one would expect to become good at tennis if he only played once a month. In order to succeed, the student should do ***all*** of the following:

1. ***Attend Class***. During the lectures relevant examples are discussed, often similar to homework problems.
2. ***Work a lot of problems***. This is the key of success in this course. Don't do just the homework exercises. *Work as many practice problems as possible*.
3. ***Seek help.*** *Ask about poorly understood points as soon as possible*.
4. ***Exam Preparation.*** Redo all the homework/practice problems.
5. ***Work neatly.*** Make sure you show all work. *Answers/solutions given with no explanation may receive little or no credit!* During the exams, if you have time, check your work.
6. ***Complete all homeworks.***
7. ***Keep track of your grade.***

A short list of programs that require College Algebra and Trigonometry:

# Adolescence Education 7-12

# Business Administration

# Early Childhood Education and Childhood Education

# Computer Science

# Drafting & Design Technology

# Engineering Science

# Environmental Studies

**Industrial Technology**

**Liberal Arts & Sciences**

**Manufacturing Technology**

**Mathematics & Science**

**Student Learning Outcomes**

***Program Based Student Learning Outcome for Liberal Art-Math and Science****: The*

*student will be able to apply appropriate mathematical procedures and quantitative*

*methods to solve practical problems in mathematics and the natural sciences*.

At the completion of the course the student will demonstrate quantitative reasoning

skills by being able to:

1. Analyze, solve and apply equations including linear, quadratic, rational, radical,

factorable polynomial, absolute value, exponential and logarithmic; and

inequalities including linear, quadratic, polynomial and rational.

2. Analyze and graph a relation in two variables in terms of domain, intercepts, and

symmetry. Analyze linear relationships including slope, y-intercept, and finding

an appropriate equation; and circles including center and radius.

3. Demonstrate comprehension of fundamental concepts of functions by evaluating,

performing operations, and determining domain and range.

4. Identify and graph basic functions including constant, linear, power, root,

reciprocal, exponential; analyze and apply the method of transformations.

5. Demonstrate proficiency with exponential and logarithmic functions and their

properties

6. Define and use the six trigonometric functions both for a right triangle and for

general angles.

**Specific Course Objectives**

At the completion of the course, the student should be able to:

1. Solve linear equations, including equations with parentheses, fractions and

decimals.

2. Solve equations containing several variables.

3. Set up appropriate linear equations and solve certain types of word problems.

4. Write a quadratic equation in standard form and solve by factoring, where

appropriate.

5. Solve quadratic equation in standard form and solve by factoring, where

appropriate.

6. Recognize a quadratic equation and choose an appropriate method for solving

that equation.

7. Solve certain types of word problems involving quadratic equations.

8. Use a calculator to solve linear and quadratic equations containing decimals or

irrational numbers.

9. Solve second and higher degree equations in the complex number system.

10. Solve equations containing either one or two radical expressions and check for

extraneous solutions.

11. Solve third and fourth degree equations by factoring, including factoring by

grouping.

12. Understand open and closed interval notation and express solutions to

inequalities using that notation.

13. Solve linear inequalities.

14. Solve quadratic and rational inequalities and inequalities of a higher degree by

using critical numbers, test intervals and the sign chart approach.

15. Solve equations and inequalities involving absolute value notation.

16. Express the solutions to all sorts of inequalities graphically, in inequality form

and in interval form.

17. Find the domain of a radical expression by solving an appropriate inequality,

where needed.

18. Understand the rectangular or Cartesian coordinate system and graph ordered

pairs of real numbers on graph paper.

19. Use the distance formula to find the distance between two points.

20. Find the midpoint of the line segment joining two points.

21. Determine whether three given points form a right triangle by using the

distance formula and the Pythagorean Theorem.

22. Determine whether a given graph has symmetry to the x-axis, y-axis, or

origin.

23. Find x and y intercepts for given equations.

24. Test given equations for symmetry to the x-axis, y-axis, and origin.

25. Find the slope of a line that passes through a given pair of points.

26. Graph a line passing through a given point and having a given slope.

27. Find the equation of a line under the following conditions:

a. given two points through which the line will pass,

b. given the slope and one point through which the line will pass

c. given the slope and y-intercept of the line.

28. Determine whether two lines are parallel, perpendicular or neither under the

following conditions:

a. given the slopes of the lines,

b. given pairs of points through which the lines will pass,

c. given the equations of the lines.

29. Write the equation of a line in slope-intercept form, point-slope form and

general form.

30. Convert the equation of a line into slope-intercept form and then determine the

slope and y-intercept of the line.

31. Write the equations of vertical and horizontal lines and determine their slopes.

32. Determine the intercepts for linear equations and construct their graphs.

33. Find the equation of a line that is parallel (perpendicular) to a given line and

passes through a given point.

34. Write the given equation of a circle in standard form, find the center and

radius and sketch the graph.

35. Write the equation of a circle with a specified center and radius.

36. Write equations involving direct and/or inverse proportionality and determine

the constant of proportionality for stated conditions. *(if time permits)*

37. Understand the definition of "function" and determine whether a given

relationship between two variables makes one variable a function of another

variable.

38. Work with function notation and evaluate functions at specified values of the

independent variable.

39. Find the domain of a function for a variety of types of functions.

40. Use the vertical line, test to determine whether a graph represents one variable

as a function of another variable.

41. Given the graph of a function, determine:

a. the domain and range of function

b. the interval(s) for which the function is increasing, decreasing, or constant.

c. what kind(s) of symmetry are present,

d. the intercepts, if any,

e. the value of the function for a specified value of the independent variable.

42. Determine whether a given equation of graph represents a function that is odd,

even or neither.

43. Graph functions of the form y=f(x) where f(x) is:

a. linear

b. quadratic

c. third degree

d. the absolute value of a linear expression

e. the square root of a linear expression

f. piecewise continuous

g. a rational expression with one vertical asymptote

44. Find the difference quotient for a given function.

45. Use the idea of translations (shifting) and reflections of the graphs of simple

functions as an aid in the construction of the graphs of more sophisticated

functions, where appropriate.

46. Combine two functions by adding, subtracting, multiplying or dividing the

functions and understand the function notation involved.

47. Find the compositions of two given functions: ( *f (g(x*)) and (*g( f* (*x*)) .

48. Graph a quadratic function and find the vertex, intercepts, equation for the

axis of symmetry, domain, range and the maximum (minimum) value of the

function.

49. Understand the definition of an exponential function and graph exponential

functions that are either increasing or decreasing. Use shifting and reflecting,

if needed. Give the domain and range.

50. Understand an exponential function and work problems involving

compound interest where the compounding is done a finite number of times

per year or is done continuously.

51. Use a calculator to do computations that are related to exponential functions

and compound interest.

52. Know and apply the definition of a logarithm and convert given equations

from exponential to logarithmic form, and conversely.

53. Graph logarithmic functions, using shifting and reflecting if needed. Give

domain and range.

54. Find the domain of a logarithmic function, without the aid of a graph.

55. Understand the properties of logarithms.

56. Use properties of logarithms to:

a. write logs of complicated expressions as sums and/or differences of

logs of simpler expressions without the involvement of products,

quotients or exponents (where possible)

b. write an expression containing two or more logs as a single log with a

coefficient of one.

57. Use a calculator to evaluate common and natural logs of numbers.

58. Use the change of base formula and a calculator to evaluate logs to any

appropriate base in terms of natural or common logs.

59. Solve log and exponential equations with the application of the properties of

logs.

60. Solve simple word problems involving exponential growth/decay.

61. Work with angles in both degrees and radians. Convert angles from degrees

to radians, and conversely.

62. Construct angles in standard position and find reference angles.

63. Use the formula s =rfor measuring arc length. *(if time permits)*

64. Find the trigonometric functions of the acute angles in a right triangle when at

least two sides of the triangle are given.

65. Know the trig functions of the special acute angles: 30˚, 60˚, and 45˚

66. Use a calculator to evaluate trig functions of angles where the angles are

expressed in degrees or radians.

67. Solve right triangles for all missing angles and/or sides when certain sides or

angles are given.

68. Solve word problems that involve right triangles

69. Find the trig functions of any angle in standard position, given a point on its

terminal side.

70. Know which trig functions are positive and which are negative for standard

position angles whose terminal sides might fall in any quadrant.

71. Construct any angle in standard position and evaluate its trig functions in

terms of the reference angle involved.

72. Given one trig function of an angle in standard position and the quadrant

involved, find the remaining trig functions of that angle.

73. Find the trig functions of quadrantal angles (multiples of 90˚) without using a

calculator.

74. Find the trig functions of an angle in standard position, when the point on the

terminal side of the angle lies on the unit circle.

75. Use the relationship between trig functions of real numbers and the unit circle

to determine the domain and range of certain trig functions.

76. Recognize and use fundamental trig identities to help in evaluating trig

functions of angles.