TAFTCOLLEGE

Prepared by: D. Jones
Reviewed by: R. Payne
Reviewed by: M. Martinez
Date Prepared: August 28, 2018
C & GE approved: September 28, 2018
Board Approved: October 10, 2018
Semester effective: Fall 2019

Mathematics (MATH) 1510 College Algebra for Liberal Arts (4 Units) CSU

Prerequisite: Successful completion of Intermediate Algebra MATH 1060 with a grade of C or better

Prerequisite knowledge and skills: Before entering the course, the student should be able to:
1. identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2. perform the basic arithmetic operations with positive and negative real numbers, plus raising to powers,
3. know and apply the rules of exponents and the order of operations in algebraic calculations,
4. apply the properties of addition and multiplication for real numbers and identify their use in practice,
5. solve linear equations and inequalities in one variable, and analyze and solve applications leading to such equations or inequalities,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable,
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on trinomials quadratic in form, and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and simplify to lowest terms,
10. solve equations involving rational algebraic expressions, and analyze and solve word problems leading to such equations,.
11. simplify radical expressions involving numbers and/or variables,
12. use fractional exponents,
13. perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results, including rationalization of denominators,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable, and equations quadratic in form, by factoring, completing the square, and the quadratic formula,
16. analyze and solve application problems requiring the use of quadratic equations,
17. solve and graph quadratic inequalities in one variable,
18. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from its equation,
19. determine the slope of the line between any specified pair of points,

20. know the slope forms of the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
21. solve and graph linear inequalities in two variables,
22. solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
23. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
24. evaluate determinants and use them to solve linear systems of equations,
25. determine whether or not a specified relation is a function,
26. for a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions in numeric or algebraic terms,
27. identify the quadratic equation representing a specific conic section, and be able to draw the graph of a conic section by analyzing its equation, or to write the equation of a specified conic section,
28. solve nonlinear systems of equation involving the intersection of two conic sections or a conic section and a straight line,
29. compute and graph specified exponential and logarithmic functions,
30. know the properties of logarithms (product, quotient, power and change of base rules) and be able to use them in practical numerical computations using a table of common logarithms or a calculator, and
31. solve simple exponential and logarithmic equations.

Total Hours: 64 hours lecture + 128 Outside-of-class Hours (192 Total Student Learning Hours)
4 Units

Catalog Description: College level course in algebra for majors in the Liberal Arts: polynomial, rational, radical, exponential, absolute value, and logarithmic functions; systems of equations; theory of polynomial equations; analytic geometry.

Type of Class/Course: Degree Credit

Texts: Lial, Hornsby, Schneider, Daniels. *Essentials of College Algebra.* 12th ed. Pearson, 2017.

Additional Required Materials: N/A

Course Objectives:

By the end of the course, a successful student will be able to:
1. Analyze and investigate properties of functions;
2. Synthesize results from the graphs and/or equations of functions;
3. Solve and apply equations including rational, linear, absolute value, polynomial, exponential, and logarithmic equations;
4. Solve linear and nonlinear systems of equations and inequalities;
5. Apply functions and other algebraic techniques to model real world applications and;

6. For additional topics:
   a. Recognize the relationship between functions and their inverses graphically and algebraically
   b. Apply transformations to the graphs of functions
   c. Use linear programming to solve problems
   d. Apply techniques for finding zeros of polynomials and roots of equations
   e. Solve and apply linear systems using matrices and determinants
   f. Analyze conics algebraically and graphically
   g. Use combinatorial rules to calculate probabilities
   h. Use sequences and series to solve application problems.

Course Scope and Content:

Unit I Equations and Inequalities
- A. Linear and Polynomial Equations
- B. Applications and Modeling with Linear Equations
- C. Complex Numbers
- D. Quadratic and Radical Equations
- E. Rational Equations and Applications
- F. Linear and Nonlinear Inequalities
- G. Absolute Value Equations and Inequalities

Unit II Graphs and Functions
- A. Rectangular Coordinates and Graphs
- B. Definition and Evaluation of Functions and Domain and Range of Functions
- C. Linear Functions
- D. Equations of Lines
- E. Graphs of Radical, Exponential, and Absolute Value Functions
- F. Graphing Techniques
- G. Algebra of Functions and Function Operations and Composition

Unit III Polynomial and Rational Functions
- A. Polynomial and Quadratic Functions
- B. Synthetic Division
- C. Characterization of the Zeros of Polynomial Functions
- D. Polynomial Functions: Graphs including intercepts and vertices
- E. Rational Functions: Graphs including asymptotes, intercepts, and vertices

Unit IV Inverse, Exponential, and Logarithmic Functions
- A. Inverse Functions
- B. Exponential Functions
- C. Logarithmic Functions
- D. Evaluating Logarithms and the Change-of-Base Theorem
- E. Exponential and Logarithmic Equations

Unit V Systems and Matrices

A. Systems of Linear Equations
B. Matrix Solution of Linear Systems
C. Determinant Solution of Linear Systems
D. Nonlinear Systems of Equations
E. Systems of Inequalities and Linear Programming
F. Properties of Matrices
G. Matrix Inverses

Learning Activities Required Outside of Class

The students in the class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1. Studying
2. Skill practice
3. Completing required reading
4. Problem solving activity or exercise

Methods of Instruction

1. Lecture-demonstrations and sample problems by instructor
2. Class discussions
3. Audiovisual presentations

Methods of Evaluation

1. Computational or non-computational problem-solving demonstrations, including:
   a. exams
   b. homework problems
   c. quizzes
   d. projects

Supplemental Data:

TOP Code:	170100: Mathematics, General
Sam Priority Code:	E: Non-Occupational
Funding Agency:	Y: Not Applicable (funds not used)

Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	E: Credit By Exam
Eligible for Pass/No Pass:	C: Pass/No Pass