Las Positas College
3000 Campus Hill Drive
Livermore, CA 94551-7650
(925) 424-1000
(925) 443-0742 (Fax)

Course Outline for MATH 45

COLLEGE ALGEBRA

Effective: Fall 2014

I. CATALOG DESCRIPTION:
MATH 45 — COLLEGE ALGEBRA — 3.00 units

Polynomial, rational, exponential, and logarithmic functions; theory of equations; matrices; translation of functions; sequences, series and the binomial theorem.

3.00 Units Lecture

Prerequisite
MATH 55 - Intermediate Algebra for STEM
with a minimum grade of C
or

MATH 55B - Intermediate Algebra for STEM B
with a minimum grade of C
or

MATH 55Y - Intermediate Algebra
with a minimum grade of C

Grading Methods:
Letter Grade

Discipline:

	MIN
Lecture Hours:	54.00
No Unit Value Lab	18.00
Total Hours:	72.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. MATH55
B. MATH55B
C. MATH55Y

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Simplify exponential, radical and rational expressions;
B. Solve linear and non linear equations, including equations with radicals, exponential equations, absolute value equations, and logarithmic equations;
C. Graph linear and nonlinear functions, including functions with radicals, exponential functions, absolute value functions, and logarithmic functions;
D. Solve applied problems involving polynomial, rational, exponential and logarithmic functions;
E. Analyze functions graphically and determine extreme values of functions;
F. Determine if a function has an inverse and find the inverse when it exists;
G. Use synthetic division to find the real zeros of a polynomial;
H. Find the real and complex roots of a polynomial;
I. Determine the asymptotic behavior of a rational function;
J. Discuss the three possible solutions of a linear system;
K. Use Gaussian elimination to put a matrix into echelon form and to solve a system of linear equations;
L. Calculate sums, scalar multiples and products of matrices;
M. Find the inverse of a matrix;
N. Analyze the graphs of circles and parabolas;
O. Find the terms of a sequence and the partial sums of a series;
P. Identify arithmetic and geometric sequences; find the nth partial sum of a geometric series; find the sum of an infinite geometric

series;
Q. Apply the binomial theorem.

V. CONTENT:
A. Review exponents and radicals
B. Review fractional Expressions
C. Equations and inequalities
1. Algebraic and graphical solution of equations
2. Modeling
3. Real and complex solutions of quadratic equations
4. Solving other types of equations
a. polynomial
b. rational
c. exponential
d. absolute value
e. logarithmic
5. Linear and nonlinear inequalities
a. polynomial
b. rational
c. absolute value
D. Functions
1. Definition of function; domain and range of a function
2. Graphs of functions
a. polynomial
b. rational
c. exponential
d. absolute value
e. logarithmic
3. Applications of functions
4. Analysis of functional behavior
a. Increasing and decreasing functions
b. Extreme values of functions
5. Transformations of functions
a. polynomial
b. rational
c. exponential
d. absolute value
e. logarithmic
6. Combining functions
7. One-to-one functions and inverse of a function
E. Polynomial and rational functions
1. Graphs of polynomial functions
2. Division of polynomials, including synthetic division
3. Real and complex zeros of a polynomial function
4. The Fundamental Theorem of Algebra
5. Rational functions and asymptotic behavior
F. Exponential and logarithmic functions
1. Definitions of exponential and logarithmic functions
2. Laws of logarithms
3. Exponential and logarithmic equations
4. Applications of exponential and logarithmic functions
G. Systems of equations
1. Systems of linear and nonlinear equations
2. Modeling with linear systems
3. Gaussian elimination and echelon form of a matrix
4. Solution of linear systems using Gaussian elimination
5. Algebra of matrices
6. Inverse of a matrix and use of the inverse to solve linear systems
H. Conic sections
1. Parabolas
2. Circles
I. Sequences and series
1. Sequences and summation notation
2. Arithmetic and geometric sequences and geometric series
3. The Binomial Theorem

VI. METHODS OF INSTRUCTION:
A. **Lecture** -
B. Any of the following at the discretion of the instructor 1. Individual problem solving 2. Group work 3. Student presentations
C. Reading
D. **Discussion** -

VII. TYPICAL ASSIGNMENTS:

A. Assign exercises from the exercise sets at the end of each section. Typical problems would be 1. Make a table of values and sketch the graph of the equation y = 1 - x2. Find x- and y-intercepts and test for symmetry. 2. The oldest child in a family of four children is twice as old as the youngest. The two middle children are 10 and 11 years old. If the average age of the children is 10-1/2 years, how old is the youngest child? 3. Sketch the graph of the function f(x) = (x - 2)2, not by plotting points, but by starting with the graph of a standard function and applying transformations. 4. Find all zeros of the polynomial f(x) = x3 + 2x2 + 4x + 8. 5. How long will it take for an investment of $1000 to double in value if the interest rate is 8.5% per year, compounded continuously? 6. Use Gaussian elimination to solve the system of linear equations {4x - 3y + z = -8, -2x + y - 3z = -4, x - y + 2z = 3}. 7. Determine the common ratio, the fifth term, and the nth term of the geometric sequence 0.3, -0.09, 0.027, -0.0081 B. A typical group activity might be to have the students get into small groups and consider the following questions: If f and g are both even functions, is f + g necessarily even? If both are odd, is their sum necessarily odd? What can you say about the sum if one is odd and one is even? In each case, prove your answer. After discussing these questions in their groups, have each group present its findings. C. A typical lab might be to have students use a software program like Winplot to graphically and numerically determine local maximum and minimum values and

x-intercepts of functions that cannot be determined analytically. Students would be asked to graph the function, use the computer to find the points of interest, and label them appropriately.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Projects
4. Home Work
5. Lab Activities
6. Other:
    a. Methods
        1. Examinations
        2. Final Exam
        3. Any or all of the following at the discretion of the instructor
            a. Homework
            b. Quizzes (announced or unannounced, in-class or take-home)
            c. Collaborative group activities or labs
            d. Presentations
            e. Projects (individual or group)

B. **Frequency**

1. Frequency of examination
    a. Minimum of three examinations plus the final

IX. TYPICAL TEXTS:

1. Stewart, J., L. Redlin, S. Watson *College Algebra.* 6th ed., Brooks/Cole, 2012.
2. Lial, M., C. Daneils, J. Hornsby, D. Schneider *College Algebra.* 11th ed., Addison-Wesley, 2012.
3. Blitzer, R. F. *College Algebra.* 6th ed., Prentice-Hall, 2012.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. A scientific or graphing calculator may be required to complete labs.