Las Positas College
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Course Outline for MATH 110

ELEMENTARY ALGEBRA

Effective: Fall 2018

I. CATALOG DESCRIPTION:
MATH 110 — ELEMENTARY ALGEBRA — 4.00 units

Elementary algebra concepts, including: real numbers and their properties; algebraic expressions; integer exponents; operations with polynomial expressions; linear and quadratic equations; linear inequalities and set notation; graphs of linear equations and inequalities; slope; systems of linear equations and inequalities; and modeling with linear and quadratic equations. May not receive credit if Mathematics 65B has been completed.

4.00 Units Lecture

Prerequisite
MATH 107 - Pre-Algebra
with a minimum grade of C
or

MATH 107B - Pre-Algebra B
with a minimum grade of C

Grading Methods:
Letter or P/NP

Discipline:
- Mathematics

	MIN
Lecture Hours:	72.00
No Unit Value Lab	18.00
Total Hours:	90.00

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. MATH107
1. perform accurate computations with whole numbers, fractions and decimals, signed and unsigned, without using a calculator;
2. simplify and evaluate variable expressions;
3. demonstrate a knowledge of ratios, proportions and precentages and their application;
4. demonstrate knowledge of geometric figures and their properties;
5. demonstrate a knowledge of the English and metric units of length, area, volume, mass, temperature and time;
6. solve linear equations involving multiple steps;
7. analyze and construct graphs of data;
8. construct graphs of linear equations in two variables in a rectangular coordinate system;
9. apply the concepts learned to specific real-life applications, such as, simple interest, business and finance, restaurants, bank statements, etc.

B. MATH107B

IV. MEASURABLE OBJECTIVES:

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

A. Perform arithmetic operations on real numbers and polynomial expressions;
B. Simplify and evaluate algebraic expressions;
C. Translate a verbal statement into an algebraic expression;
D. Solve linear equations in one variable;
E. Solve a formula for a specified variable;
F. Solve and graph a linear inequality in one variable and express the solution using correct interval or set notation;
G. Find the equation of a line;
H. Develop and graph linear equations in two variables using various methods;
I. Apply concepts of slopes and rates of change;
J. Solve systems of linear equations in two variables by one of the following methods: graphing, elimination or substitution;

K. Solve linear inequalities in two variables and systems of linear inequalities in two variables;
L. Apply the rules for integer exponents;
M. Write numbers and perform computations using scientific notation;
N. Factor polynomials completely;
O. Solve polynomial and quadratic equations;
P. Solve, justify, and interpret the solution in the context of a modeling problem.

V. CONTENT:
A. Real Numbers
1. Operations with real numbers
2. Positive integer exponents
3. Order of operations
4. Properties of real numbers
B. Algebraic Expressions
1. Simplifying expressions
2. Writing expressions
C. Linear Equations in One Variable
1. Solving linear equations in one variable
2. Solving a formula for a specified variable
3. Solving applied problems
D. Linear Inequalities in One Variable
1. Solutions and their graphs
2. Set and interval notation
E. Linear Equations in Two Variables
1. Rectangular coordinate system
2. Graphing linear equations in two variables
a. Tables of solutions
b. Intercepts
c. Horizontal and vertical lines
3. Slopes
a. Slope formula
b. Rates of change
c. Parallel and perpendicular lines
d. Horizontal and vertical lines
4. Equations of lines
a. Slope-intercept form
b. Point-slope form
5. Modeling with linear data
F. Systems of Linear Equations in Two Variables
1. Types of solutions and solution terminology
2. Methods of solution
a. Graphing
b. Substitution
c. Elimination
3. Applications of linear systems
G. Linear Inequalities in Two Variables and Systems of Linear Inequalities
H. Integer Exponents
1. Exponent rules
2. Scientific notation
I. Polynomials
1. Classification
2. Simplification and evaluation
3. Operations with polynomials: addition, subtraction, multiplication, division
4. Special products
J. Factoring Polynomials
1. Common factors
2. Factoring by grouping
3. Trinomials
4. Factoring formulas
a. Difference of two squares
b. Perfect square trinomials
c. Sum of two cubes
d. Difference of two cubes
5. General factoring strategy
K. Solving Quadratic and Higher Degree Polynomials by Factoring
L. Applications of Quadratic Equations

VI. METHODS OF INSTRUCTION:
A. Any of the following at the discretion of the instructor: 1. Individual problem solving 2. Group work 3. Student presentations
B. **Discussion** -
C. **Lab** - assignments
D. **Individualized Instruction** -
E. **Lecture** -
F. **Classroom Activity** -

VII. TYPICAL ASSIGNMENTS:
A. Homework
1. Problems from the text should be assigned for each section covered. The number of problems assigned may vary from section to section and from instructor to instructor, but the homework assignments should include a sufficient number and variety of problems to develop both skill and conceptual understanding. A typical assignment should take an average student 1 to 2 hours for each hour in class.
2. The majority of the problems assigned should be those for which answers are readily available (e.g., from the answer appendix in the text), so that students may obtain immediate feedback on their work. 3. Homework assignments may include reading the text. Students may be asked to read sections in advance of the lecture and then to re-read them after the lecture, to reinforce important concepts and skills. An instructor may require written work in conjunction with the reading assignments (e.g., have students complete a Q & A sheet related to the assigned reading)
B. Laboratory
1. Lab assignments can be used to reinforce fundamental concepts and skills or to explore certain concepts in more depth than is possible in-class. They may be designated for individual or group work. Lab assignments are completed in the Open Math

Lab where students have access to assistance with the assignments.
2. Sample lab assignment: Students explore concepts related to slopes and interpretation of slopes as a rate of change by examining graphical, numerical, algebraic and verbal representations of slope.

C. In-Class
1. Collaborative learning, done in small groups of 2-4 students, can be used to introduce new concepts, build skills, or teach problem solving. Students may be asked to present their results on the board.
2. Sample collaborative learning assignment: To introduce systems of linear equations and illustrate the three possible types of solutions, first divide the class into thirds, then ask each third to break-up into smaller groups. Have one-third of the class graph a system of linear equations with a unique solution; have one-third of the class graph a system of parallel lines (no solution); and have one-third graph a system of two identical lines (infinite number of solutions). In each third, give one of the groups a transparency with a graphing grid and have them draw their solution on the grid. Use the overhead projector to show the three types of solutions.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Group Projects
4. Class Work
5. Home Work
6. Lab Activities
7. Other:
   Comprehensive final examination

B. **Frequency**

1. Recommend minimum of four exams plus the cumulative final
2. Recommend frequent quizzes or graded homework, to provide regular feedback to the student regarding mastery of concepts.
3. Homework should be assigned for each section covered
4. Recommend minimum of eight laboratory assignments over the semester.
5. Time should be allowed in class for students to apply the concepts being covered. This can be done individually, in groups or as part of projects.
6. Number of quizzes and collaborative activities are at the discretion of the instructor

IX. TYPICAL TEXTS:

1. Rockswold, Gary , and Terry Krieger. *Beginning and Intermediate Algebra.* 4th ed., Pearson/Addison-Wesley, 2018.
2. Blitzer, Robert. *Introductory & Intermediate Algebra.* 5th ed., Pearson/Prentice-Hall, 2017.
3. Tussy, Alan, and Diane Koenig. *Introductory Algebra.* 5th ed., Cengage, 2015.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Scientific calculator