

EASTERN ARIZONA COLLEGE

Precalculus Algebra

Course Design
2017-2018

Course Information

Division Mathematics
Course Number MAT 154 (SUN# MAT 1151)
Title Precalculus Algebra
Credits 4
Developed by Gary Roth
Lecture/Lab Ratio 4 Lecture/0 Lab

Transfer Status

ASU	NAU	UA
MAT 117 (3) & MAT Dept Elective (1) , Mathematics (MA)	MAT Departmental Elective --and-- MAT 110; Foundation Requirement [FNRQ]	MATH 112

Activity Course No
CIP Code 27.0101
Assessment Mode Pre/Post Test (25 Questions/100 Points)
Semester Taught Fall and Spring
GE Category Mathematics
Separate Lab No
Awareness Course No
Intensive Writing Course No

Prerequisites

MAT 120 with a grade of "C" or higher or placement test score as established by District policy and ENG 091 with a grade of "C" or higher or reading placement test score as established by District policy

Educational Value

This course is designed for students with a solid algebra background who plan to take further instruction in mathematics.

Description

A first course to prepare students for calculus. Topics include functions, graphs, equations, exponentials, logarithms, matrices, and conic sections. Optional topics may include sequences and series.

Supplies

Scientific calculator; TI-83 or TI-84 recommended

Competencies and Performance Standards

1. Apply algebraic techniques to solve equations.

Learning objectives

What you will learn as you master the competency:

- a. Compute results involving adding, subtracting, multiplying, dividing, and exponents with complex numbers.
- b. Recognize, create, and use conjugates.
- c. Solve quadratic equations by factoring, completing the square, or by the quadratic formula.
- d. Solve quadratic form equations.
- e. Solve rational equations.
- f. Use the discriminant to determine the number and type of solutions of a quadratic equation.
- g. Apply quadratic equations to a variety of applications.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two-hour cumulative final exam

Your performance will be successful when:

- learner solves a variety of algebraic equations and inequalities
- learner translates word problems into algebraic equations

2. Analyze functions and their graphs.

Learning objectives

What you will learn as you master the competency:

- a. Distinguish when a function is increasing, decreasing, or constant.
- b. Identify local maxima and local minima given the graph of a function.
- c. Graph piecewise defined functions.
- d. Determine if a function is one-to-one using the horizontal line test.
- e. Determine the inverse of a one-to-one function.
- f. Determine if a function has x-axis, y-axis, or origin symmetry.
- g. Determine if a function is even or odd.
- h. Use transformations to change the graph of a function.

Performance Standards

You will demonstrate your competence:

- with functions expressed in a variety of forms such as, tables, graphs, equations, sets of ordered pairs, verbal descriptions
- on assigned activities
- on written exams
- on a two-hour cumulative final exam

Your performance will be successful when:

- learner identifies attributes of the graph of a function
- learner determines the domain, range and inverse of a relation

- o learner reads and writes using function notation correctly
- o learner performs operations of addition, subtraction, multiplication, division, and composition with functions
- o learner uses basic functions and transformations to sketch graphs

3. Examine polynomial and rational functions in detail.

Learning objectives

What you will learn as you master the competency:

- a. Use the leading term test to determine the end behavior of a polynomial function.
- b. Use multiplicity of zeros to determine the behavior of a polynomial at a zero.
- c. Use the Fundamental Theorem of Algebra to determine the number of zeros of a polynomial.
- d. Use the Rational Zeros Theorem to create a list of possible rational zeros.
- e. Use the Intermediate Value Theorem to determine if a zero exists between two values.
- f. Use synthetic division to determine if a value is a zero of a polynomial.
- g. Evaluate polynomials using the Remainder Theorem.
- h. Determine the coordinates of the vertex and the intercepts of a quadratic function.
- i. Graph quadratic functions.
- j. Determine the zeros and the y- intercept of higher degree polynomial functions.
- k. Sketch higher degree polynomial functions.
- l. Determine the asymptotes and the intercepts of rational functions.
- m. Graph rational functions.

Performance Standards

You will demonstrate your competence:

- o on assigned activities
- o on written exams
- o on a two-hour cumulative final exam

Your performance will be successful when:

- o learner identifies the vertex and intercepts, and sketches the graph of any quadratic function
- o learner identifies the zeros and y-intercept, and sketches the graph of higher degree polynomials
- o learner identifies the asymptotes and intercepts, and sketches the graph of rational functions

4. Analyze the properties, graphs, and applications of exponential and logarithmic functions.

Learning objectives

What you will learn as you master the competency:

- a. Simplify exponential and logarithmic expressions.
- b. Solve exponential and logarithmic equations.
- c. Sketch the graphs of exponential and logarithmic functions.
- d. Apply exponential and logarithmic functions in various contextual problems.
- e. Use the properties of logarithms to expand a logarithmic expression into sums and differences of logarithms.

- f. Use the properties of logarithms to write a logarithmic expression as a single logarithm.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two-hour cumulative final exam

Your performance will be successful when:

- learner simplifies exponential and logarithmic expressions
- learner solves exponential and logarithmic equations
- learner sketches the graphs of exponential and logarithmic functions
- learner correctly models real world situations with exponential or logarithmic functions

5. Apply systems of equations and matrices.

Learning objectives

What you will learn as you master the competency:

- a. Solve systems of equations using Gaussian Elimination or Gauss-Jordan Elimination.
- b. Solve systems of equations using Cramer's Rule.
- c. Perform basic operations with matrices.
- d. Translate a word problem into a system of equations.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two-hour cumulative exam

Your performance will be successful when:

- learner solves a system of equations in two and three variables by the following methods: Gaussian Elimination or Gauss-Jordan Elimination
- learner performs matrix operations such as: adding, subtracting, multiplying and scalar multiplication
- learner solves a system of equations using Cramer's Rule
- learner translates a word problem into a system of equations

6. Analyze conic sections.

Learning objectives

What you will learn as you master the competency:

- a. Convert between standard form and general form of a conic.
- b. Determine the center and radius of a circle.
- c. Determine the directrix, vertex, axis of symmetry, and focus of a parabola.
- d. Determine the center, foci, and vertices, major and minor axes of an ellipse.
- e. Determine the center, foci, vertices, and asymptotes, transverse and conjugate axis of a hyperbola.
- f. Solve nonlinear systems involving conic sections.

Performance Standards

You will demonstrate your competence:

- on assigned activities
- on written exams
- on a two-hour cumulative exam

Your performance will be successful when:

- learner draws the graph, and identifies the parts of conic sections
- learner solves a nonlinear system involving conic sections
- learner converts between general form and standard form of a conic section
- learner translates a word problem into a system of equations

Types of Instruction

Classroom Presentation

Grading Information

Grading Rationale

Each instructor has the flexibility to develop evaluative procedures within the following parameters.

1. Written exams must represent at least 60% of the final course grade.
2. Final exam must represent at least 20% of the final course grade.
3. The Post Test is to be embedded in the final exam and must represent at least 10% of the final course grade.
4. Other activities may represent at most 20% of the final course grade.

Grading Scale

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
F	Below 60%