

MATH 29 : PRE-CALCULUS MATHEMATICS

California State University, Sacramento · Department of Mathematics & Statistics

This is a one-semester lower division course that is designed to prepare students for Calculus. The students in this course are already expected to possess a strong background in algebra. The emphasis in the course is on functions and the relationships between algebra and geometry. Polynomial, rational, exponential, logarithmic, and trigonometric functions are stressed. Students will be given periodic writing assignments that encourage them to think through course concepts.

CATALOG DESCRIPTION

Designed to prepare students for calculus. Topics: trigonometry, points and lines in the Cartesian plane; lines and planes in space, transformation of coordinates; the conics; graphs of algebraic relations; the elementary transcendental functions. **Graded:** Graded Student. **Units:** 4.0.

PREREQUISITES

Math 11 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of the ELM requirement and a passing score on the Intermediate Algebra diagnostic test.

LEARNING OBJECTIVES

- Understand the algebraic properties of exponents and radicals and use these properties to simplify and expand algebraic expressions and to solve algebraic equations and inequalities
- Know the algebraic definitions and graphs of linear and quadratic functions, power, general polynomial, and rational functions, and exponential and logarithmic functions
- Know the general definition of a function and use this definition to determine when a relation is a function. Determine the algebraic definition of the inverse of a function from the algebraic definition of the function.
- Use the properties of translation and symmetry to graph compound functions.
- Understand the basic concepts of right angle trigonometry and solve trigonometric equations using the principles of right angle trigonometry, the law of cosines, and the law of sines.
- Know the definitions and graphs of the inverse trigonometric functions.

TEXT

Precalculus with Limits, 3/e, by Ron Larson

COVERAGE

Chapters 1-10

WRITING COMPONENT

This is an area B4 GE course and has a writing component. To satisfy the writing requirement graded assignments involving writing and understanding of complex technical prose, interpretation of theoretical ideas, and the use of mathematical ideas will be part of the course.

ASSIGNMENTS

A variety of reading and problem solving assignments will be part of the course.

EXAMINATIONS

There will be regular midterm examinations and a comprehensive final examination for this course.

COURSE OUTLINE

I. Review of Algebra (1 Week)

- A. Absolute value, exponents, roots, and factoring
- B. Absolute value and quadratic equations and inequalities
- C. Rectangular coordinates

II. Graphs and Functions (3 Weeks)

- A. Graphs of equations and symmetry
- B. Definition of function, domain and range, function notation
- C. Graphs of functions
- D. Graphing techniques - translating, stretching, and reflecting
- E. Algebraic operations on functions and function composition
- F. Inverse functions

III. Polynomial and Rational Functions (3 Weeks)

- A. Linear and quadratic functions
- B. Polynomial division and the factor theorem
- C. Polynomial and rational equations and inequalities
- D. Graphing polynomials and rational functions (use of intercepts and asymptotes)

IV. Exponential and Logarithmic Functions (2 Weeks)

- A. Exponential functions and their properties
- B. Logarithmic functions and their properties
- C. Graphs of exponential and logarithmic functions
- D. Exponential and logarithmic equations
- E. Applications

V. Trigonometric Functions (5 Weeks)

- A. Right triangle trigonometry
- B. Fundamental identities
- C. Law of Sines and the Law of Cosines

- D. Radian measure and the unit circle
- E. Definitions of the trigonometric functions
- F. Other important identities
- G. Graphing the trigonometric functions
- H. Trigonometric equations
- I. The inverse trigonometric functions

VI. A Brief Introduction to Analytic Geometry (1 Week)

- A. Circles and ellipses
- B. Parabolas and hyperbolas
- C. Translation of axes

Sample