

Mathematics (MATH) 1540 Precalculus Mathematics (4 Unit) CSU: UC  
[formerly Mathematics 15]

Prerequisite: Successful completion in Mathematics 1060 or the knowledge and skills equivalent to the successful completion of an intermediate algebra course and Mathematics 1530 (Trigonometry), or the equivalent

Prerequisite knowledge/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,
3. know and apply the rules of exponents and the order of operations in algebraic calculations,
4. know and 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,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable, and
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on quadratic trinomials and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and reduce to lowest terms,
10. solve equations involving rational algebraic expressions,
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,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable by factoring, completing the square and the quadratic formula,
16. solve and graph quadratic inequalities in one variable,
17. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from a linear equation,
18. determine the slope of the line between any specified pair of points,
19. know the slope formulas for the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
20. solve and graph linear inequalities in two variables,
21. solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
22. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
23. evaluate determinants and use them to solve linear systems of equations,
24. determine whether or not a specified relation is a function,
25. given 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,



Advisory: Eligibility for English 1000 and Reading 1005 strongly recommended

Hours and Units Calculations:

64 hours lecture. 128 Outside of class hours. (192 Total Student learning hours) 4 Units

Catalog Description: Preparation for calculus: polynomial, absolute value, radical, rational, exponential, logarithmic, and trigonometric functions and their graphs; analytic geometry, polar coordinates.

Type of Class/Course: Degree Credit

Text: Lial, Margaret L., et al. *Precalculus*. 7<sup>th</sup> ed. Pearson, 2021.

Additional Required Materials:

MyMathLab, Graphing calculator

Upon successful completion of the course, students will be able to:

1. Graph functions and relations in rectangular coordinates and polar coordinates;
2. Synthesize results from the graphs and/or equations of functions and relations;
3. Apply transformations to the graphs of functions and relations;
4. Recognize the relationship between functions and their inverses graphically and algebraically;
5. Solve and apply equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic, and solve linear, nonlinear, and absolute value inequalities;
6. Solve systems of equations and inequalities;
7. Apply functions to model real world applications;
8. Identify special triangles and their related angle and side measures;
9. Evaluate the trigonometric function of an angle given in degree and radian measure;
10. Manipulate and simplify a trigonometric expression;
11. Solve trigonometric equations, triangles, and applications;
12. Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs; and
13. Prove trigonometric identities

Course Scope and Content:

Unit I

- A. Rectangular Coordinates and Graphs
- B. Circles
- C. Functions
- D. Linear Functions
- E. Equations of Lines and Linear Models
- F. Graphs of Basic Functions
- G. Graphing Techniques
- H. Function Operations and Composition

Unit II

- A. Quadratic Functions and Models
- B. Synthetic Division
- C. Zeros of Polynomial Functions
- D. Polynomial Functions: Graphs, Applications, and Models
- E. Rational Functions: Graphs, Applications, and Models



### Unit III

- A. Inverse Functions
- B. Exponential Functions
- C. Logarithmic Functions
- D. Evaluating Logarithms and the Change-of-Base Theorem
- E. Exponential and Logarithmic Equations
- F. Applications and Models of Exponential Growth and Decay

### Unit IV

- A. Angles
- B. Trigonometric Functions
- C. Trigonometric Functions Values and Angle Measures
- D. Solutions and Applications of Right Triangles

### Unit V

- A. Radian Measure
- B. The Unit Circle and Circular Functions
- C. Graphs of Sine and Cosine Functions
- D. Translations of Graphs of the Sine and Cosine Function
- E. Graphs of Tangent and Cotangent Functions
- F. Graphs of Secant and Cosecant Functions

### Unit VI

- A. Polar Equations and Graphs
- B. Parametric Equations, Graphs, and Applications
- C. Systems of Linear Equations
- D. Matrix Solution of Linear Systems
- E. Determinant Solution of Linear Systems
- F. Partial Fractions
- G. Systems of Inequalities and Linear Programming
- H. Properties of Matrices
- I. Matrix Inverses

### Learning Activities Required Outside of Class:

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

1. Studying,
2. Answering questions,
3. Skill practice,
4. Completing required reading, and
5. Problem solving activity or exercise.

### Methods of Instruction:

1. Lecture-demonstrations and sample problems solved by the instructor.

### Methods of Evaluation:

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

- d. projects, and
- e. activities

Supplemental Data:

TOP Code:	170100: Mathematics, General
SAM Priority Code:	E: Non-Occupational
Distance Education:	Not Applicable
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
Taft College General Education:	CSB4: CSU Area B4 IG2A: IGETC Area 2A LCAT: Local GE Communication
Discipline	Mathematics