

CATALOG INFORMATION

Dept and Nbr: MATH 27            Title: PRECALC ALG AND TRIG  
Full Title: Precalculus Algebra and Trigonometry  
Last Reviewed: 3/14/2022

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |       |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 5.00 | Lecture Scheduled     | 5.00 | 17.5         | Lecture Scheduled  | 87.50 |
| Minimum | 5.00 | Lab Scheduled         | 0    | 8            | Lab Scheduled      | 0     |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0     |
|         |      | Contact Total         | 5.00 |              | Contact Total      | 87.50 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0     |

Total Out of Class Hours: 175.00

Total Student Learning Hours: 262.50

Title 5 Category: AA Degree Applicable  
Grading:            Grade Only  
Repeatability:    00 - Two Repeats if Grade was D, F, NC, or NP  
Also Listed As:  
Formerly:        MATH 57

**Catalog Description:**  
College algebra and trigonometry topics, including analytic geometry, functions and their graphs, trigonometric functions of angles, trigonometric identities, trigonometric solution of triangles, polar coordinates, parametric equations, complex numbers, vectors, sequences and series.

**Prerequisites/Corequisites:**  
Completion of MATH 155 or higher

**Recommended Preparation:**

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: College algebra and trigonometry topics, including analytic geometry, functions and their graphs, trigonometric functions of angles, trigonometric identities, trigonometric solution of triangles, polar coordinates, parametric equations, complex numbers, vectors, sequences and series. (Grade Only)  
Prerequisites/Corequisites: Completion of MATH 155 or higher

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |  |                   |                  |
|----------------------|----------------------|--|-------------------|------------------|
| <b>AS Degree:</b>    | <b>Area</b>          |  | <b>Effective:</b> | <b>Inactive:</b> |
|                      | B                    | Communication and Analytical Thinking          | Fall 1981         |                  |
|                      | MC                   | Math Competency                                |                   |                  |
| <b>CSU GE:</b>       | <b>Transfer Area</b> |  | <b>Effective:</b> | <b>Inactive:</b> |
|                      | B4                   | Math/Quantitative Reasoning                    | Fall 1996         |                  |
|                      | B4                   | Math/Quantitative Reasoning                    | Fall 1981         | Spring 1984      |
| <b>IGETC:</b>        | <b>Transfer Area</b> |  | <b>Effective:</b> | <b>Inactive:</b> |
|                      | 2A                   | Mathematical Concepts & Quantitative Reasoning | Fall 1998         |                  |
| <b>CSU Transfer:</b> | Transferable         |  | <b>Effective:</b> | <b>Inactive:</b> |
|                      |                      |  | Fall 1981         |                  |
| <b>UC Transfer:</b>  | Transferable         |  | <b>Effective:</b> | <b>Inactive:</b> |
|                      |                      |  | Fall 1998         |                  |

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

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

1. Perform advanced operations with functions (using symbolic, graphical, and numerical representations) and apply knowledge to application and modeling problems.
2. Define and graph inverse functions.
3. Define the trigonometric functions, using both right triangle and unit circle approaches, and develop applications of radian measure.
4. Define and apply characteristics of functions (including intercepts, turning points, extreme values, intervals of positive/negative/increasing/decreasing value, transformations, symmetry) in graphing polynomial, rational, absolute value, radical, exponential, logarithmic, trigonometric, and inverse trigonometric functions.
5. Graph asymptotes and recognize a hole in the graph.
6. Develop and verify trigonometric identities.
7. Solve equations symbolically and graphically --involving polynomial, rational, absolute value, radical, exponential, logarithmic, and trigonometric functions -- over the real numbers; and, as appropriate, the complex numbers.
8. Solve application and modeling problems using the trigonometric functions, identities, and the Laws of Sines and Cosines.
9. Represent complex numbers in, and perform operations using, trigonometric form.

10. Graph circles, piecewise-defined functions, and parametric equations.

## **Topics and Scope:**

- I. Equations and Inequalities
  - A. Graphical and algebraic solutions to radical and quadratic-form equations, and to absolute value equations and inequalities
  - B. Solutions to systems of nonlinear equations
- II. Topics From Analytic Geometry
  - A. Midpoint and distance formulas
  - B. Circles
- III. Analysis of Functions and Their Graphs
  - A. Definition
  - B. Notation
  - C. Domain
  - D. Range
  - E. Operations, including difference quotients and composition of functions
  - F. Catalog of functions
  - G. Symmetry
  - H. Even and odd functions
  - I. Shifts
  - J. Scaling
  - K. Reflections of graphs, along with modeling
- IV. Polynomial and Rational Functions
  - A. Linear, quadratic, polynomial functions of higher degree and their graphs
  - B. Graphs of rational functions
  - C. Asymptotes and holes
  - D. Introduction to limit concepts and notation
  - E. Solutions of polynomial and rational equations and inequalities, using real numbers and complex numbers as appropriate
- V. Inverse, Exponential and Logarithmic Functions
  - A. Definitions
  - B. Properties
  - C. Graphs
  - D. Equations
  - E. Applications
- VI. Trigonometric Functions
  - A. Radian and degree measures of angles
    - 1. Arc length
    - 2. Area of a sector
    - 3. Linear and angular velocity
  - B. Right triangle and unit circle definitions
  - C. Characteristics of trigonometric functions
- VII. Identities and Conditional Equations
  - A. Fundamental identities
  - B. Sum and difference identities
  - C. Related identities and their derivations
  - D. Conditional trigonometric equations and applications
- VIII. Graphical Representation of Trigonometric Functions
  - A. Amplitude
  - B. Period

- C. Phase (horizontal) shifts
- IX. Inverse Trigonometric Functions
  - A. Definitions
  - B. Properties of inverse trigonometric functions
  - C. Inverse trigonometric functions and their graphs
- X. Solutions of Triangles
  - A. Right triangles
  - B. Oblique triangles
  - C. Laws of Sines and Cosines
  - D. Applications
- XI. Complex Numbers, Polar Coordinates, and Parametric Equations
  - A. Definitions
  - B. Operations
  - C. Graphical representation of complex numbers
  - D. DeMoivre's Theorem
  - E. Polar coordinates
  - F. Parametric equations
- XII. Two Dimensional Vectors
  - A. Geometric and analytic definitions
  - B. Algebra of vectors
  - C. Trigonometric form of vectors
  - D. Dot product
  - E. Applications
- XIII. Sequences and Series
  - A. Finite and infinite geometric sequences and series
  - B. Summation of powers of integers

### Assignment:

1. Daily reading outside of class (20-50 pages per week).
2. Problem set assignments from required text(s) or supplementary materials chosen by the instructor (1-6 per week).
3. Quizzes (0-4 per week).
4. Exams (3-8 per term).
5. Projects (for example, computer explorations or modeling activities, 0-10 per term).

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

|  |                                |
|--|--------------------------------|
| Homework problems  | Problem solving<br>5 - 20%     |
| <b>Skill Demonstrations:</b> All skill-based and physical demonstrations used for assessment purposes including skill performance exams. |                                |
| None   | Skill Demonstrations<br>0 - 0% |
| <b>Exams:</b> All forms of formal testing, other than skill performance exams.   |                                |
| Multiple choice and free response exams; quizzes   | Exams<br>70 - 95%              |
| <b>Other:</b> Includes any assessment tools that do not logically fit into the above categories.   |                                |
| Projects   | Other Category<br>0 - 10%      |

**Representative Textbooks and Materials:**  
Algebra & Trigonometry Enhanced with Graphing Utilities (5th ed).  
Sullivan, Michael and Sullivan III, Michael. Prentice Hall: 2009.