

Miami Dade College
MAC 1114 Trigonometry

Course Description

This course is primarily designed for students who expect to take physics and/or the courses in the calculus sequence. The student will analyze and graph trigonometric functions and inverse trigonometric functions. The student will learn and use the fundamental trigonometric identities and solve conditional trigonometric equations. The student will solve both right and oblique triangles. The student will perform operations on complex numbers in trigonometric form, work with vectors, and graph both polar and parametric equations. The student will solve applications and modeling problems related to the above topics. (3 hrs. lecture)

Pre-requisite: MAC 1105 with a grade of C or better or equivalent

Course Competencies:

Competency 1: The student will demonstrate an understanding of the trigonometric functions by

- a. defining the functions in three different ways: as ratios of sides of a right triangle, as functions of an angle in standard position in a Cartesian plane, and as functions of a real number, as represented by an arc length along the unit circle.
- b. graphing the trigonometric functions, and their transformations.
- c. finding approximate values of the trigonometric functions using a calculator.
- d. finding exact values of trigonometric functions of multiples of 30° or 45° and their radian equivalents.

Competency 2: The student will demonstrate an understanding of inverse trigonometric functions by

- a. defining the inverse trigonometric functions and stating their domains and ranges.
- b. evaluating inverse trigonometric functions both with and without a calculator.

Competency 3: The student will demonstrate an understanding of trigonometric identities by

- a. simplifying trigonometric expressions.
- b. finding exact values of trigonometric functions of sums and differences of angles and half-angles.
- c. proving trigonometric identities.

Competency 4: The student will demonstrate an ability to solve conditional trigonometric equations by

- a. finding all solutions on a specified interval.
- b. finding all real number solutions.
- c. using identities to solve equations.

Competency 5: The student will demonstrate an ability to solve triangles by

- a. solving right triangles.
- b. solving oblique triangles using the Law of Sines or the Law of Cosines.

Competency 6: The student will demonstrate an understanding of complex numbers in trigonometric form by

- a. converting a complex number from standard $(a + bi)$ form to trigonometric form, and vice versa.
- b. multiplying and dividing complex numbers in trigonometric form
- c. raising complex numbers to positive integer powers using DeMoivre's Theorem
- d. finding the n complex n^{th} roots of a complex number

Competency 7: The student will demonstrate an understanding of vectors by

- a. adding vectors geometrically.
- b. resolving vectors into components.
- c. adding vectors algebraically, both in component form and when expressed as linear combinations of the standard basis.

Competency 8: The student will demonstrate an understanding of parametric equations by

- a. sketching the graphs of curves defined parametrically.
- b. eliminating the parameter to find a corresponding rectangular equation.

Competency 9: The student will demonstrate an understanding of polar coordinates by

- a. converting from rectangular coordinates to polar coordinates and vice versa.
- b. transforming rectangular equations into polar equations and vice versa
- c. graphing polar equations.

Competency 10: The student will demonstrate an understanding of applications of trigonometry by solving problems including, but not limited to

- a. arc lengths and areas of circular sectors.
- b. right triangles.
- c. oblique triangles.
- d. vectors.