

## 1 Warning

Community College of Philadelphia is a firm adherent to the principle of academic freedom. In light of this, faculty are not required to follow a particular approach or a particular textbook for the courses they teach. Most faculty, however, have more or less uniform guidelines for specific courses, and indeed, many use a particular textbook or approach in order to conform to area institutions. Therefore, the sample syllabus found here is not binding to faculty, but represents a synthesis of what most faculty do or aspire to do when they teach a particular course. What follows should not be interpreted as a prescription, but rather, as a means to help the placement of our students in transfer institutions.

## 2 Catalogue Description

Exponential and logarithmic functions, sine and cosine functions and additional trigonometric functions, identities, inverse trigonometric functions, polar coordinates, vectors in the plane, dot product, the complex plane, complex numbers, parametric representations, translation and rotation of axes. Prerequisite: MATH 161

## 3 Allotted Time

Math 162 is a 3-credit course. Courses at Community College of Philadelphia run for about **42 55**-minute periods. Instructors usually give three or four exams (generally lasting at least **55** minutes), and a 2-hour long final exam.

## 4 Topics Outline

- The Natural Exponential Function: Its graph and properties. Compound interest.
- Logarithmic Functions: Their graphs and properties.
- Exponential Growth and Decay.
- Radian and degree measures.
- The Sine and Cosine Functions: Special Values. Symmetry Properties. Periodicity.
- The Graphs of the Sine and Cosine Functions.
- Other Trigonometric Functions: Their graphs and properties.
- Trigonometric Identities: Pythagorean Identities. Sum and Difference Identities. Double and Half and Angle Identities.
- Right Angle Trigonometry: Simple Geometric Applications.
- Inverse Trigonometric Functions.

- Al-Kashi's Law of Cosines and the Law of Sines. Heron's Formula.
- Parabolas: Focus, Directrix.
- Ellipses: Foci.
- Hyperbolas: Foci. Asymptotes.
- Polar Coordinates: Cardioids, Limaçons, Roses.
- Conics in Polar Coordinates.
- Parametric Curves.

## 5 Competencies

1. The student will demonstrate an understanding of exponential and logarithmic functions by
  - (a) identifying the domain of logarithmic and exponential functions.
  - (b) graphing logarithmic and exponential functions using transformations.
  - (c) solving equations involving logarithmic and exponential functions.
  - (d) using mathematical modeling to solve applications of logarithmic and exponential functions.
2. The Student will demonstrate knowledge of the trigonometric functions their properties and their graphs by:
  - (a) Defining the functions in three different ways
  - (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 with reference angles of measures 0, 30, 45, 60, 90 degrees and their radian equivalents
3. The Student will demonstrate knowledge of inverse trigonometric functions their properties and their graphs by:
  - (a) Defining the inverse trigonometric functions including domains and ranges.
  - (b) Graphing inverse trigonometric functions
4. The Student will demonstrate knowledge of trigonometric identities by
  - (a) Simplifying trigonometric expressions
  - (b) Finding exact values of sums and differences of angles, half angles
  - (c) Proving trigonometric identities
5. The Student will demonstrate knowledge of solving trigonometric equations by

- (a) Finding all solutions on the domain  $[0; 2\pi]$
  - (b) Finding all solutions on the real numbers
  - (c) Using identities to solve equations.
6. The Student will demonstrate knowledge of solving triangles by:
- (a) Solving right triangles.
  - (b) Solving triangles using the Law of Sines or the Law of Cosines.
7. The Student will demonstrate knowledge of parametric equations by
- (a) Sketching the graphs of curves given parametrically
  - (b) Eliminating parameters
8. The Student will demonstrate knowledge of polar coordinates by
- (a) Transforming rectangular coordinates to polar coordinates and vice versa.
  - (b) Transforming rectangular equations to polar equations and vice versa
  - (c) Graph curves in the polar coordinate system.
9. The Student will demonstrate knowledge of applications of trigonometry by solving problems involving, but not limited to, the following:
- (a) Arcs and Sectors
  - (b) Right triangles
  - (c) Acute and oblique triangles
10. The student will demonstrate an understanding of the conic sections by
- (a) identifying them as the result of intersecting a plane with a cone.
  - (b) writing an equation for a parabola, ellipse or hyperbola in standard form given sufficient information about the conic.
  - (c) graphing a parabola, ellipse or hyperbola in standard form given sufficient information about the conic or given its equation.
  - (d) solving application problems involving parabolas, ellipses, and hyperbolas.