



# ILLINOIS VALLEY COMMUNITY COLLEGE

## COURSE OUTLINE

**DIVISION:** Natural Sciences and Business

**COURSE:** MTH 1004 Trigonometry

Date: Spring 2022

Credit Hours: 3

*Complete all that apply or mark "None" where appropriate:*

Prerequisite(s): MTH 0908 and MTH 0920 with a C or better

Enrollment by assessment or other measure?  Yes  No

If yes, please describe: By appropriate assessment

Corequisite(s): None

Pre- or Corequisite(s): None

Consent of Instructor:  Yes  No

Delivery Method:  **Lecture**                    **3 Contact Hours** (1 contact = 1 credit hour)  
 **Seminar**                    **0 Contact Hours** (1 contact = 1 credit hour)  
 **Lab**                                **0 Contact Hours** (2-3 contact = 1 credit hour)  
 **Clinical**                    **0 Contact Hours** (3 contact = 1 credit hour)  
 **Online**  
 **Blended**  
 **Virtual Class Meeting (VCM)**

Offered:  **Fall**     **Spring**     **Summer**

**CATALOG DESCRIPTION and IAI NUMBER (if applicable):**

This course is primarily for students who need to continue on in the study of mathematics. Topics of the study include trigonometric functions, equations, graphs, identities, and applications of trigonometry including vectors, polar equations, and parametric equations.

## ACCREDITATION STATEMENTS AND COURSE NOTES:

None

## COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Basic Preparing for Trigonometry
  - a. angles
  - b. angle relationships in similar triangles
  - c. trigonometric functions
  - d. definitions of the trigonometric functions
2. Right Triangle Trigonometry
  - a. trigonometric functions of acute angles
  - b. trigonometric functions of non-acute angles
  - c. finding trigonometric function values using a calculator
  - d. solving right triangles
  - e. further right triangle applications
3. Radian Measure and Circular Functions
  - a. radian measure
  - b. applications of radian measure
  - c. the unit circle
  - d. linear and angular speed
4. Graphs of the Circular Functions
  - a. sine and cosine graphs
  - b. translating sine and cosine graphs
  - c. tangent and cotangent graphs
  - d. secant and cosecant graphs
5. Trigonometric Identities
  - a. fundamental identities
  - b. verifying trigonometric identities
  - c. sum and difference identities
  - d. double-angle identities
  - e. half-angle identities
6. Inverse Circular Functions and Trigonometric Equations
  - a. inverse circular functions
  - b. trigonometric equations
  - c. equations involving trigonometric functions
7. Applications of Trigonometry and Vectors
  - a. the law of sines
  - b. the law of cosines
  - c. vector operations and the dot product
  - d. vector applications
8. Complex Numbers, Polar Equations, and Parametric Equations
  - a. complex numbers
  - b. trigonometric (polar) form of complex numbers
  - c. product and quotient theorems
  - d. De Moivre's theorem of powers and roots of complex numbers
  - e. polar equations and graphs
  - f. parametric equations, graphs and applications

## **INSTRUCTIONAL METHODS:**

1. Lecture
2. Class participation
3. Pair or group activity
4. On-line reinforcement
5. Homework
6. Instructional exams

## **EVALUATION OF STUDENT ACHIEVEMENT:**

1. Hand in assignment
2. On-line assignments
3. Class participation
4. Tests
5. Final Exam

## **INSTRUCTIONAL MATERIALS:**

### **Textbooks**

1. Text: Trigonometry, Lial/Hornsby/Schneider Trigonometry, 12<sup>th</sup> edition, Pearson Addison Wesley, 2017
2. My Math Lab software

### **Resources**

None

## **LEARNING OUTCOMES AND GOALS:**

### **Institutional Learning Outcomes**

- 1) Communication – to communicate effectively;
- 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion;
- 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally;
- 4) Responsibility – to recognize how personal choices affect self and society.

### **Course Outcomes and Competencies**

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

1. demonstrate knowledge of fundamental concepts of geometry and algebra needed for trigonometry
  - 1.1 identify types of angles
  - 1.2 determine angle measure from a picture including triangles and parallel lines
  - 1.3 determine side lengths and angle measures in similar and congruent triangles
  - 1.4 determine the six trig values of a right triangle
  - 1.5 apply the reciprocal identities
  - 1.6 apply the Pythagorean identities
2. demonstrate an ability to use the six basic trigonometric functions in all quadrants
  - 2.1 solve a right triangle for missing pieces
  - 2.2 apply the cofunction identities
  - 2.3 determine special triangles and understand their 6 trig values

- 2.4 find trig values for any special non-quadrantal angle
- 2.5 use a calculator to find trig values
- 2.6 convert from decimal degrees to degrees, minutes and second and back
- 2.7 solve a right triangle application
- 2.8 solve a simple bearing problem
3. demonstrate knowledge of radian measure
  - 3.1 convert from degrees to radians and back
  - 3.2 understand the radian concept
  - 3.3 apply the arc length formula and area of a sector formula
  - 3.4 understand how to use the unit circle
  - 3.5 apply the formulas for angular and linear speed
4. demonstrate graphing ability of the trigonometric functions
  - 4.1 graph the 6 trig functions
  - 4.2 apply vertical stretches and period changes to the 6 trig functions
  - 4.3 apply shifts to the 6 trig functions
  - 4.4 create equations from trigonometric graphs
  - 4.5 understand simple harmonic motion
5. demonstrate the ability to solve trigonometric identities
  - 5.1 apply basic identities (reciprocal, quotient, Pythagorean, negative angle)
  - 5.2 apply other identities (cofunction, sum, difference, double angle, product to sum, sum to product, half angle)
6. demonstrate the ability to work with inverse trigonometric equations
  - 6.1 understand range and domain of the inverse trig functions
  - 6.2 solve trig equations using algebraic techniques
  - 6.3 solve trig equations for a variable using inverse trig functions
7. demonstrate the ability to solve acute and obtuse triangles, and work with vectors
  - 7.1 apply the law of sines, including the ambiguous case
  - 7.2 apply the law of cosines
  - 7.3 find area of a triangle using Heron's formula or the vector formula
  - 7.4 determine magnitude and direction of a vector
  - 7.5 determine the component pieces of a vector, given magnitude and direction
  - 7.6 add and scalar multiply vectors
  - 7.7 apply the dot product
  - 7.8 determine the angle between vectors
8. demonstrate the ability to work with complex numbers and graph polar and parametric equations
  - 8.1 apply the definition of  $i$
  - 8.2 apply the four basic operations on complex numbers
  - 8.3 convert complex numbers from rectangular to polar form and back
  - 8.4 apply the product and quotient theorems for complex numbers
  - 8.5 apply De Moivre's power and root theorems for complex numbers
  - 8.6 graph polar equations
  - 8.7 convert equations from polar to rectangular and back
  - 8.8 graph parametric equations
  - 8.9 understand the relationship between parametric and other equations