# MATH-1540: TRIGONOMETRY

## Cuyahoga Community College

### Viewing: MATH-1540 : Trigonometry

**Board of Trustees:**
June 2022

**Academic Term:**
Fall 2021

**Subject Code**
MATH - Mathematics

**Course Number:**
1540

**Title:**
Trigonometry

**Catalog Description:**
This course is part of a two semester sequence. Topics include trigonometric functions and their values for all angles, vectors and oblique triangles, graphs of trigonometric functions, trigonometric identities and equations. Applications and activities to build skills in problem solving included.

**Credit Hour(s):**
3

**Lecture Hour(s):**
3

### Requisites

**Prerequisite and Corequisite**
MATH-1530 College Algebra or qualified math placement; or departmental approval: equivalent coursework.
Note: MATH-1275 MATH-1280, MATH-1521, or MATH-152H taken prior to Fall 2016 will be accepted to meet prerequisite requirements for this course.

### Outcomes

**Course Outcome(s):**
Define and evaluate trigonometric functions.

**Essential Learning Outcome Mapping:**
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**
1. Define and use the vocabulary of angles.
2. Evaluate the six trigonometric functions using the unit circle, a right triangle, or any angle.
3. Graph the six trigonometric functions and their transformations.
4. Evaluate the inverse trigonometric functions.
5. Model and solve applications of trigonometric functions.

---

**Course Outcome(s):**
Analyze, define, and interpret analytic trigonometry.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Verify identities using fundamental trigonometric identities.
2. Verify identities using the sum/difference, double angle, power-reducing angle, and half-angle formulas.
3. Define and apply the sum/difference, double angle, power-reducing, and half-angle formulas to find exact values of trigonometric expressions.
4. Solve trigonometric equations.

---

**Course Outcome(s):**

Analyze, interpret, define and apply the Laws of Trigonometry and their Applications.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Use the Law of Sines and Law of Cosines to solve oblique triangles.
2. Define, graph, and perform operations with complex numbers.
3. Define, graph, and analyze polar coordinates and polar equations.
4. Define, model and perform operations with vectors and their applications.

---

**Methods of Evaluation:**

1. Exams
2. Quizzes
3. Homework
4. Projects
5. Collaborative work
6. Comprehensive final exam

**Course Content Outline:**

1. Vocabulary of angles
   a. Standard position
   b. Quadrantal, coterminal, and reference angles
   c. Degree and radian measure
   d. Arc length
   e. Linear and angular speed
2. Six trigonometric functions
   a. Unit circle
   b. Right triangle ratios
   c. Any angle function
   d. Exact value of 30°(#/6), 45°(#/4), 60°(#/3) angles
   e. Using calculator
3. Graphs of trigonometric functions
   a. Domain and range
   b. Period and amplitude
   c. Phase and vertical shift
   d. Asymptotes
4. Inverse trigonometric functions

   a. Restricted domains
   b. Exact value
   c. Composite functions
   d. Using a calculator
5. Modeling and applications of trigonometric functions
   a. Using right triangles
   b. Bearing from point to point
   c. Simple harmonic motion
6. Basic trigonometric identities
   a. Reciprocal
   b. Quotient
   c. Pythagorean
   d. Even-odd
7. Principal trigonometric identities
   a. Sum and difference
   b. Double-angle and half-angle
   c. Power-reducing
   d. Cofunction
   e. Sum-to-product and product-to-sum
8. Solving trigonometric equations
   a. Single trigonometric functions
   b. Equations involving multiple angles
   c. Using calculator
9. The Law of Sines and Law of Cosines
   a. Oblique (AAS, ASA, SSA) triangles and Law of Sines
   b. Oblique (SAS, SSS) triangles and Law of Cosines
   c. Area of oblique triangles
10. Complex numbers
   a. Graphical representation
   b. Trigonometric notation
   c. Multiplication and division
   d. Powers and roots of complex numbers
11. Polar coordinates
   a. Rectangular coordinates as polar
   b. Complex coordinates as polar
   c. Polar and rectangular equations
   d. Graphs of polar equations
12. Vectors
   a. Direction and magnitude
   b. Scalar
   c. Position and unit vector
   d. Operations on vectors
   e. Dot product and angle between vectors
   f. Modeling and applications

## Resources

Beecher, Penna, Bittinger. *Precalculus: A Right Triangle Approach*. 5th ed. Pearson, 2016.

Blitzer, Robert. *Precalculus*. 6th ed. Pearson, 2018.

*Desmos*. Desmos, Inc., 2021. www.desmos.com

*Khan Academy*. Khan Academy, 2021. https://www.khanacademy.org/

## Instructional Services

**OAN Number:**

Ohio Transfer 36 TMM003 Trigonometry and TMM002 Precalculus (1 of 2 courses, both MATH-1530 and MATH-1540 must be taken to meet TMM002)

Top of page

Key: 2855