

**MISSOURI WESTERN STATE UNIVERSITY**

**COLLEGE OF SCIENCE AND HEALTH**

**DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS**

**COURSE NUMBER:** MAT 119

**COURSE NAME:** Trigonometry

**COURSE DESCRIPTION:**

Trigonometric functions, trigonometric identities, trigonometric equations, solution of triangles, inverse trigonometric functions. Offered Fall and Spring semesters.

**PREREQUISITE:**

ACT math subscore of at least 22; a sufficient score on the math placement exam; a minimum grade of C in MAT 110 or MAT 110E or higher; departmental approval. (Not open to the student with credit in MAT 165 or MAT 167)

**TEXTBOOK:**

*Trigonometry*, by Mark Dugopolski, 5<sup>th</sup> Edition, 2020, Pearson

**TECHNOLOGY:**

The use of a graphing calculator will be required throughout the course and each student must have his own calculator. The calculator must have at least the capability of the TI 83. (The TI 83 or TI 84 is recommended.) While graphing calculators other than the TI 84 may be used, classroom instruction will be given only for the TI 84.

**COURSE OBJECTIVES:**

The student will learn to:

1. Measure angles in degrees and radians and convert from one type of measure to the other.
2. Use trigonometry to solve right and oblique triangles.
3. Use a calculator to evaluate trigonometric functions of angles.
4. Find trigonometric functions of real numbers.
5. Graph a trigonometric equation of the form  $y = a[f[b(x - c)]] + d$ .
6. Solve conditional trigonometric equations.

7. Recognize and verify trigonometric identities.
8. Memorize basic identities.
9. Use inverse trigonometric functions.
10. Correctly analyze the ambiguous case.
11. Work with vectors.
12. Plot points in polar coordinates.
13. Graph polar equations.

***STUDENT COMPETENCIES:***

The student will:

1. Know when an angle is in standard position.
2. Understand radian measure and be able to convert between radians and degrees. (*Precalculus V.A.1*)
3. Apply radian measure to linear and angular velocity. (*Precalculus V.A.3*)
4. Be able to use the arc length and area of a sector formulas. (*Precalculus V.A.2*)
5. Know the basic identities. (*Precalculus V.B.1*)
6. Use the unit circle definition to evaluate the six trigonometric functions at an angle given a point on the terminal side of the angle that intersects the unit circle. (*Precalculus V.A.4, V.A.5*)
7. Use the definition of the trigonometric functions to evaluate sine, cosine, tangent, cotangent, secant, and cosecant of an angle given a point on the terminal side of the angle. (*Precalculus IV.A.2, V.A.5*)
8. Know the sign of the trigonometric function of an angle based on the quadrant location of the angle. (*Precalculus V.A.5*)
9. Be able to use a calculator to evaluate a trigonometric function of an angle, which is measured in degrees or radians.
10. Be able to give the exact values of trigonometric functions of special angles. (*Precalculus V.A.7*)

11. Use right triangle trigonometry and the Pythagorean Theorem in real world applications. (*Precalculus IV.A.1, IV.A.2, IV.A.3, V.A.6*)
12. Use reference angles and right-angle trigonometry to evaluate trigonometric functions of angles. (*Precalculus V.A.6, V.F.1*)
13. Identify amplitude, period, frequency, phase shift, and vertical and horizontal shifts and stretches in graphs of trigonometric functions. (*Precalculus V.C.1*)
14. Graph trigonometric functions of the form  $y = a f[b(x - c)] + d$  using properties of the graph. (*Precalculus V.C.2*)
15. Use identities including double angle, half-angle, sum and addition identities to simplify an expression. (*Precalculus V.B.2, V.B.3, V.D.1*)
16. Be able to verify or refute a proposed identity. (*Precalculus V.D.1*)
17. Be able to solve a conditional trigonometric equation. (*Precalculus V.D.2*)
18. Understand what is meant by an inverse trigonometric function and evaluate inverse trigonometric functions using a calculator or reference angles. (*Precalculus V.F.1*)
19. Be able to graph the inverse trigonometric functions and identify the domain and range. (*Precalculus V.F.3*)
20. Solve equations using properties of inverse trigonometric functions. (*Precalculus V.F.2*)
21. Solve right triangle problems using the trigonometric functions or the Pythagorean theorem. (*Precalculus V.B.1*)
22. Solve oblique triangle problems by using the law of sines and the law of cosines. (*Precalculus V.E.1*)
23. Be able to correctly analyze the ambiguous case.
24. Find the magnitude and direction for a vector, given its initial point and its terminal point. (*Precalculus V.G.1*)
25. Find the horizontal and vertical components of a vector, given its magnitude and direction. (*Precalculus V.G.2*)
26. Perform vector operations (*Precalculus V.G.3*)
27. Be able to plot points using polar coordinates and represent vectors in polar form. (*Precalculus V.G.4*)
28. Be able to graph polar equations.

***COURSE OUTLINE:***

- I. Algebraic prerequisites
- II. Angles and the trigonometric functions
- III. Graphs of the trigonometric functions
- IV. Trigonometric identities
- V. Solving conditional trigonometric equations
- VI. Applications of trigonometry
- VII. Polar coordinates