

MAT 155 Trigonometry

MAT 155 Course Objectives

1. State the definition of the six trigonometric functions in their multiple forms.
2. Compute trigonometric function values using the definitions.
3. State basic trigonometric identities.
4. Apply the trigonometric function definitions to right triangles.
5. Find trigonometric values of angles.
6. Solve right triangle application problems.
7. Solve problems involving vectors and right triangles.
8. Use radian and degree measure.
9. Solve application problems using radian measure.
10. Graph the six trigonometric functions.
11. Determine the amplitude and period of the trigonometric functions.
12. Determine the inverse functions for the six trigonometric functions.
13. Prove trigonometric identities.
14. Solve problems using the sum and difference and double-angle formulas.
15. Solve trigonometric equations.
16. Solve general triangles using the Law of Sines and the Law of Cosines.
17. Put complex numbers into trigonometric form.
18. Calculate complex roots of numbers.
19. Plot points in polar coordinates.
20. Graph equations in polar coordinates.

MAT 155 Course Competencies

General Education Competencies

- A. Knowledge of human cultures and the physical and natural worlds through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts.
- B. Intellectual and practical skills, including
 - inquiry and analysis
 - critical and creative thinking
 - written and oral communication
 - quantitative literacy
 - information literacy
 - teamwork and problem solving
- C. Personal and social responsibility, including
 - civic knowledge and engagement (local and global)
 - intercultural knowledge and competence
 - ethical reasoning and action
 - foundations and skills for lifelong learning
- D. Integrative and applied learning, including synthesis and advanced accomplishment across general and specialized skills.

Student Learning Outcomes for Quantitative Reasoning
In MAT 155, students will learn to:

1. Interpret information presented in mathematical and/or statistical forms by (Gen Ed Comp B):
 - Stating the definition of the six trigonometric functions in their multiple forms.
 - Stating basic trigonometric identities.
 - Using radian and degree measure.
 - Determining the inverse functions for the six trigonometric functions.
2. Illustrate and communicate mathematical and/or statistical information symbolically, visually, and/or numerically by (Gen Ed Comp A, B, C):
 - Solving problems involving vectors and right triangles.
 - Graphing the six trigonometric functions.
 - Determining the amplitude and period of the trigonometric functions.
 - Putting complex numbers into trigonometric form.
 - Plotting points in polar coordinates.
 - Graphing equations in polar coordinates.
3. Determine when computations are needed and execute the appropriate computations by (Gen Ed Comp A, B):
 - Computing trigonometric function values using the definitions.
 - Finding trigonometric values of angles.
 - Solving trigonometric equations.
 - Calculating complex roots of numbers.
4. Apply an appropriate model to the problem to be solved by (Gen Ed Comp A, B, C):
 - Applying the trigonometric function definitions to right triangles.
 - Solving right triangle application problems.
 - Solving application problems using radian measure.
5. Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis by (Gen Ed Comp A, D):
 - Proving trigonometric identities.
 - Solving problems using the sum and difference and double-angle formulas.
 - Solving general triangles using the Law of Sines and the Law of Cosines.

MAT 155 Course Outline

- I. Six Trigonometric Functions
 - A. Angles, Degrees, and Special Triangles
 - B. The Rectangular System
 - C. Definitions of the Trigonometric Functions
 - D. Introduction to Identities
- II. Right Triangle Trigonometry
 - A. Right Triangle Trigonometric Definitions
 - B. Calculator and Trigonometric Functions of an Acute Angle
 - C. Solving Right Triangles
 - D. Applications
 - E. Vectors

- III. Radian Measure
 - A. Reference Angle
 - B. Radians and Degrees
 - C. Definitions of the Circular Functions
 - D. Arc Length and Area of a Sector Formulas
 - E. Linear and Angular Velocities
- IV. Graphing and Inverse Functions
 - A. Basic Graphs
 - B. Amplitude and Period
 - C. Phase Shift
 - D. Inverse Trigonometric functions
- V. Identities and Formulas
 - A. Proving Identities
 - B. Sum and Difference Formulas
 - C. Double-Angle Formulas
 - D. Half-Angle Formulas
 - E. Other Identities
- VI. Trigonometric Equations
 - A. Solving Trigonometric Equations
 - B. Trigonometric Equations Involving Multiple Angles
 - C. Parametric Equations and Further Graphing
- VII. General Triangles
 - A. Law of Sines
 - B. Law of Cosines
 - C. Area of a General Triangle
- VIII. Complex Numbers and Polar Coordinates
 - A. Complex Numbers
 - B. Trigonometric Form for Complex Numbers
 - C. Products and Quotients in Trigonometric Form
 - D. Roots of a Complex Number
 - E. Polar Coordinates
 - F. Equations in Polar Coordinates