

MAT 172
PRECALCULUS TRIGONOMETRY

COURSE DESCRIPTION:

Prerequisites: MAT 171 or satisfactory score on placement test

Corequisites: MAT 172A

This is the second of two courses designed to emphasize topics which are fundamental to the study of calculus. Emphasis is on properties and applications of transcendental functions and their graphs, right and oblique triangle trigonometry, conic sections, vectors, and polar coordinates. Upon completion, students should be able to solve practical problems and use appropriate models for analysis and prediction. This course has been approved to satisfy the Comprehensive Articulation Agreement for the general education core requirement in natural sciences/mathematics. MAT 161 does not satisfy the prerequisite for MAT 172. Course Hours Per Week: Class, 3. Semester Hours Credit, 3.

LEARNING OUTCOMES:

- I. Students will be able to define, identify, and graph angles and trigonometric functions and their properties, and use trigonometry to solve practical problems both analytically and with the use of technology. Students will display proficiency by demonstrating the following competencies:
 - a. Describe the measure of an angle in both radians and degrees; convert angles measured in degrees to radian measure and vice versa.
 - b. Given a circle, find arc length and area of a sector.
 - c. Find the linear and angular speed of an object traveling in circular motion.
 - d. Find the values of the trigonometric functions using the Unit Circle.
 - e. State the basic trigonometric definitions and apply them to the acute angles of a right triangle.
 - f. State the basic trigonometric relationships and apply them to any angle in standard position.
 - g. Find the trigonometric values of the 30° , 45° , and 60° reference angles in any quadrant.
 - h. Approximate the trigonometric value of any angle using a calculator.
 - i. Identify the domain, range, amplitude, period, and extrema, and sketch the graphs of the trigonometric functions.
 - j. Graph transformations of the trigonometric functions.
 - k. Identify the domain and range and sketch the graph of the inverse trigonometric functions.
 - l. Evaluate expressions involving the inverse trigonometric functions.
 - m. State basic trigonometric identities.
 - n. Verify selected trigonometric identities.
 - o. State and apply the trigonometric formulas for sums and differences of angles.

- p. State and apply the trigonometric formulas for double and half angles.
 - q. Solve trigonometric equations.
 - r. Solve applied problems using right triangle trigonometry.
 - s. Solve applied problems using the Law of Sines.
 - t. Solve applied problems using the Law of Cosines.
 - u. Find the area of triangles.
 - v. Use a computer-algebra system for trigonometric applications.
- II. Students will be able to perform computations, graph and solve practical problems utilizing polar coordinates, vectors and parametric equations involving trigonometric expressions both analytically and with the use of technology. Students will display proficiency by demonstrating the following competencies:
- a. Convert polar coordinates to rectangular coordinates and vice versa.
 - b. Graph polar equations.
 - c. Convert complex numbers to polar form.
 - d. Use DeMoivre's Theorem to find the n th root of a complex number.
 - e. Define a vector and express it in trigonometric form.
 - f. Use vectors to solve selected practical problems.
 - g. Find rectangular equations for curves defined parametrically.
 - h. Use parametric equations to model the motion of an object.
 - i. Graph parametric equations involving trigonometric expressions.
 - j. Use a computer-algebra system for polar and parametric graphs.
- III. Students will be able to graph and identify the properties of the conic sections. Students will display proficiency by demonstrating the following competencies.
- a. State the definition and give the standard form of the equation of the conic sections.
 - b. Sketch the graphs of conic sections involving vertical and horizontal translations.
 - c. Graph and find rectangular equations for conics that are defined parametrically.

OUTLINE OF INSTRUCTION:

- I. Trigonometric functions
 - A. Angles and their measure
 - B. Trigonometric functions: unit circle approach
 - C. Properties of the trigonometric functions
 - D. Graphs of the sine and cosine functions
 - E. Graphs of the tangent, cotangent, cosecant and secant functions
 - F. Phase shifts; sinusoidal curve fitting
- II. Analytic trigonometry
 - A. The inverse trigonometric functions
 - B. Trigonometric identities
 - C. Sum and difference formulas

- D. Double-angle and half-angle formulas
- E. Trigonometric equations
- III. Applications of trigonometric functions
 - A. Right triangle trigonometry
 - B. Law of Sines
 - C. Law of Cosines
 - D. Area of a Triangle
- IV. Polar coordinates; vectors
 - A. Polar coordinates
 - B. Polar equations and graphs
 - C. The complex plane
 - D. DeMoivre's Theorem
 - E. Vectors
- V. Analytic Geometry
 - A. Conics
 - B. The parabola
 - C. The ellipse
 - D. The hyperbola
 - E. Plane curves and parametric equations
- VI. Computer-algebra system

REQUIRED TEXTBOOKS AND MATERIALS:

Sullivan, Michael and Michael Sullivan, III. Precalculus Enhanced with Graphing Utilities. 5th Ed. Pearson Prentice Hall, 2009.

TI-83/84 Graphing Calculator

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.