

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

MATHEMATICS 170 – ANALYTIC TRIGONOMETRY

3 hours lecture, 3 units

Catalog Description

Theoretical approach to the study of the trigonometric functions with emphasis on circular functions, trigonometric identities, trigonometric equations, graphical methods, vectors and applications, complex numbers, and solving triangles with applications. *Successful completion of MATH 170 and 175 is equivalent to the successful completion of MATH 176. Maximum of 7 units can be earned for successfully completing any combination of MATH 170, 175, 176.*

Prerequisite

Appropriate Placement or Intermediate Algebra

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Computing and Simplifying:
 - a. Algebraic and rational expressions
 - b. Exponents and radicals
 - c. Complex numbers
 - d. Using formulas
- 2) Factoring Polynomials
- 3) Graphing:
 - a. Functions and their inverses
 - b. Determine an equation from its graph
 - c. Recognize families of curves
- 4) Functions:
 - a. Determine the domain and range
 - b. Find the inverse
 - c. Perform operations
- 5) Geometry:
 - a. Formulas for geometric objects
 - b. Properties of geometric figures
- 6) Mathematical Reasoning and Problem Solving:
 - a. Inductively and deductively
 - b. Communication of a mathematical argument
- 7) Solving:
 - a. Linear, polynomial and rational equations
 - b. System of linear equations

Course Content

- 1) Rectangular coordinates, angles and circular/radian measure
- 2) Definitions of the six trigonometric functions according to the right triangle, the unit circle, and the rectangular coordinate system
- 3) Applications of the right triangle
- 4) Simplification of trigonometric expressions
- 5) Proofs of trigonometric identities

- 6) Graphs of trigonometric functions: period, amplitude, phase shift, asymptotes
- 7) Inverse trigonometric functions and their graphs
- 8) Trigonometric equations
- 9) Solving Triangles: Law of Sines and Law of Cosines

Course Objectives

Students will be able to:

- 1) Identify special triangles and their related angle and side measures;
- 2) Evaluate the trigonometric function of an angle in degree and radian measure;
- 3) Manipulate and simplify a trigonometric expression;
- 4) Solve trigonometric equations, triangles, and applications;
- 5) Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs;
- 6) Evaluate and graph inverse trigonometric functions;
- 7) Prove trigonometric identities;
- 8) Calculate vector sum, vector products, dot products, vector magnitudes and vector angles;
- 9) Analyze physical problems and create trigonometric relationships involving triangles, the coordinate system, the unit circle or vectors.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Exploration activities (both independent and group) which measure students' ability to discover how different parameters affect the graphs of trigonometric functions, or how to combine trigonometric relationships to prove a new trigonometric identity.
- 2) Homework assignments which measure students' ability to: select and evaluate trigonometric functions, make computations in degrees and radians, create graphs of trigonometric functions, transform an expression with identities, and construct a plan and carry out the plan to solve trigonometric word problems.
- 3) Exams, including a comprehensive final exam and quizzes which measure students' ability to: define and calculate with all six trigonometric functions in degrees and radians, sketch graphs of trigonometric functions as well as discuss the functions' domain and range, construct a logical sequence of transformations which verify trigonometric identities, and breakdown a physical problem into trigonometric components in order to produce a solution.

Special Materials Required of Student

Calculator

Minimum Instructional Facilities

Smart classroom with whiteboards covering three walls, graphing utility and viewscreen, overhead projector

Method of Instruction

- 1) Lecture and discussion
- 2) Teamwork
- 3) Instructor-guided discovery
- 4) Computer-facilitated instruction

Out-of-Class Assignments

- 1) Problem sets
- 2) Exploratory activities and/or projects
- 3) Reading and/or writing assignments

Texts and References

- 1) Required (representative example): McKeague & Turner. *Trigonometry*. 8th edition. Cengage, 2018.
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Understanding essential vocabulary and basic concepts related to:
 - a. Radian and degree measure
 - b. Trigonometric functions of any angle
 - c. Right triangle trigonometry
- 2) Graphing:
 - a. Graph trigonometric function
 - b. Derive equations from graphs of all trigonometric functions
 - c. Employ ideas of amplitude, period, frequency, phase shift
- 3) Understanding and applying function concepts of:
 - a. Inverse trigonometric functions
 - b. Domain and range of inverse functions
 - c. Relating to calculator use
- 4) Mathematical Reasoning:
 - a. Know the basic identities
 - b. Verify other identities
 - c. Solve trigonometric equations
- 5) Solve applications involving:
 - a. Right and oblique triangles
 - b. The Pythagorean Theorem
 - c. Law of sines
 - d. Law of cosines and vectors
- 6) Using Trigonometric Form of Complex Numbers

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Use analytical, numerical, and graphical methods to solve trigonometric problems.
- 2) Solve multi-disciplinary application problems and interpret the results in context.

*For the complete list of **learning objectives**, please see the **Course Objectives** section