

COURSE OUTLINE **Trigonometry**

Course Description

MA 140. Trigonometry. 3 hours credit. Prerequisites: Placement score or MA131 or MA135 or its equivalent with a C or better. This course will enable the student to identify and manipulate trigonometric functions, solve triangles, use and prove identities, solve trigonometric equations, use and apply vectors to real-life models, and use complex numbers and polar coordinates.

Course Relevance

The concepts learned in this course are essential for study in calculus and physics. Trigonometry expands the repertoire of solvable problems from standard algebra and geometry. Trigonometry has applications in navigation, construction, surveying and other technical fields.

Required Materials

McKeague, C. P. and Turner, M. D. (2008) *Trigonometry* (6th ed.). Belmont, CA: Thomson Learning, Inc.

Graphing Calculator: TI83 or TI 84 is recommended. If another calculator is used, the student is responsible for learning how to use it.

Supplemental Materials

Student's Solution Manual for McKeague/Turner's Trigonometry

Learning Outcomes

The intention is for the student to be able to

1. Recognize the six trigonometric functions.
2. Use technology to find values of the trigonometric functions.
3. Use trigonometry in more advanced coursework.
4. Use trigonometric concepts in applied problems and technical fields.

Learning PACT Skills that will be DEVELOPED and/or documented in this course

Through the student's involvement in this course, he/she will develop his/her ability in the following PACT skill areas:

Analytical Thinking Skills

1. Problem Solving
 - Through the solution of multi-step problems, the student develops problem solving skills and the ability to think linearly.
 - Through the solution of word problems, the student develops the ability to apply problem solving skills to real-life applications.

Technology Skills

2. Discipline-specific technology

- Through the use of the graphing calculator, the student develops skill in using this math tool for mathematical problems.

Major Summative Assessment Task(s)

These learning outcomes and the Learning PACT skills will be demonstrated by

1. Solving a multi-step problem (A skill) that synthesizes trigonometric concepts. The problem will involve an application to a real-life situation (word problem) and may require the use of the graphing calculator (T skill).

Course Content

- I. Themes – Key recurring concepts that run throughout this course:
 - A. Angles and angle measure
 - B. The six trigonometric functions
- II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
 - A. Transferring textual concepts to graphs
 - B. Remembering prerequisite material
 - C. Following logical proof sequences
- III. Concepts – Key concepts that must be understood to address the issues:
 - A. Standard notation
 - B. Vector notation
 - C. Radian and degree measure
 - D. Graphing
 - E. Trigonometric definitions and theorems
- IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
 - A. Factoring trigonometric expressions
 - B. Simplifying trigonometric expressions
 - C. Solving trigonometric equations
 - D. Modeling in trigonometric and vector applications
 - E. Graphing and using the graphing calculator for trigonometric functions
 - F. Operations with complex numbers, vectors and polar coordinates

Learning Units

- I. The six trigonometric functions
 - A. Angles, degrees and special triangles
 - B. The rectangular coordinate system
 - C. The circle definition of the trigonometric functions
 - D. Introduction to identities
- II. Right triangle trigonometry
 - A. Right triangle definition of the trigonometric functions
 - B. Evaluating trigonometric functions with a calculator
 - C. Solving right triangles
 - D. Applications of right triangles

- III. Radian measure
 - A. Reference angles
 - B. Radians and degrees
 - C. Circular functions
 - D. Arc length and area of a sector

- IV. Graphing and inverse functions
 - A. Basic graphs
 - B. Amplitude, reflection and period
 - C. Vertical translation and phase shift
 - D. Graphing other trigonometric functions
 - E. Finding an equation from its graph
 - F. Graphing combinations of functions
 - G. Inverse trigonometric functions

- V. Identities and formulas
 - A. Proving identities
 - B. Sum and difference formulas
 - C. Double-angle formulas
 - D. Half-angle formulas
 - E. Additional identities

- VI. Equations
 - A. Solving trigonometric equations
 - B. Trigonometric equations involving multiple angles

- VII. Triangles
 - A. The Law of Sines, including the ambiguous case
 - B. The Law of Cosines
 - C. The area of a triangle
 - D. Vectors, including the dot product

- VIII. Complex numbers and polar coordinates
 - A. Trigonometric form for complex numbers
 - B. Products and quotients in trigonometric form
 - C. Roots of a complex number
 - D. Polar coordinates
 - E. Equations in polar form and their graphs

Learning Activities

Independent learning activities will be assigned to assist the students in achieving the intended learning outcomes. Activities identified in the syllabus, such as class discussion, lecture, reading, group work or projects will also contribute to learning.

Grade Determination

Grade determination will be based on assessment tasks and other activities such as exams, assignments, projects or participation in classroom or online activities that the instructor identifies in the syllabus.