MAC1114 Course Outline

Trigonometry...(3) (P)

Description: This course, in combination with MAC1140, will prepare students to take the calculus sequence MAC2311, MAC2312, and MAC2313. The course includes an in-depth study of the trigonometric functions and their properties and graphs, inverse trigonometric functions and their properties and graphs, trigonometric identities, conditional trigonometric equations, vector algebra, parametric equations, polar coordinates, solutions of triangles, and applications.

General Education Learning Outcome: The primary General Education Learning Outcome (GELO) for this course is Quantitative Reasoning, which is to understand and apply mathematical concepts and reasoning, and analyze and interpret various types of data. The GELO will be assessed through targeted questions on either the comprehensive final or an outside assignment.

Prerequisite: MAC1105 with a grade of "C" or better, OR the equivalent.

Rationale: In an increasingly complex world, mathematical thinking, understanding, and skill are more important than ever. This course provides students with skills and proficiency in understanding concepts needed for the calculus sequence, and the opportunity to learn to communicate and reason mathematically.

Impact Assessment: *Trigonometry* is a prerequisite for MAC2311 and is required for many degrees in mathematics and the sciences. This course will provide the opportunity for an in-depth understanding of the trigonometric functions and some of their applications. The course applies toward the General Education mathematics requirement area A for an Associate of Arts degree.

Broad Course Objectives: This course supports the following goals of the Math Department:

- Engage students in sound mathematical thinking and reasoning. This should include students finding patterns, generalizing, and asking/answering relevant questions.
- Provide a setting that prepares students to read and learn mathematics on their own.
- Explore multiple representations of topics including graphical, symbolic, numerical, oral, and written. Encourage students to make connections among the various representations to gain a richer, more flexible understanding of each concept.
- Analyze the structure of real-world problems and plan solution strategies. Solve the problems using appropriate tools.
- Develop a mathematical vocabulary by expressing mathematical ideas orally and in writing.
- Enhance and reinforce the student's understanding of concepts through the use of technology when appropriate.

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As a result of successfully completing MAC1114, students should be able to demonstrate the following:

- Analyze/interpret quantitative data verbally, graphically, symbolically and numerically.
- Communicate quantitative data verbally, graphically, symbolically and numerically.
- Appropriately integrate technology into mathematical processes.
- Use mathematical concepts in problem-solving through integration of new material and modeling.

Topical Outline with Specific Course Objectives:

I. *Trigonometric functions, their properties and graphs*

   A. Demonstrate an understanding of the trigonometric functions as functions of real numbers.

   B. Analyze and interpret trigonometric functions using graphs, tables and equations.

   C. Discuss the scientific basis for radian measure.

II. *Inverse trigonometric functions, their properties and graphs*

   A. Construct the inverse of a trigonometric function, both graphically and algebraically when feasible.

III. *Trigonometric identities*

   A. Verify and apply trigonometric identities.

IV. *Conditional trigonometric equations*

   A. Solve trigonometric equations numerically, graphically, and algebraically.

V. *Solutions of triangles*

   A. Demonstrate the ability to find unknown angles and side lengths using trigonometry

   B. Solve applications using solutions of triangles.

VI. *Vector algebra*

   A. Demonstrate an understanding of vectors, their graphical representation and vector algebra.

VII. *Parametric equations*

   A. Sketch and identify graphs using parametric equations.

   B. Convert rectangular equations to parametric form and vice versa.

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VIII. *Polar coordinates*

    A. Sketch and identify graphs in polar coordinates.

    B. Convert rectangular equations to polar form and vice versa.

IX. *Applications*

    A. Model real-world applications using the trigonometric functions.

    B. Apply radian measure to arc length and area.

Evaluation: Each instructor will determine the specific criteria for determining the final course grade. These criteria will be delineated in the first day handout provided to each student. Each instructor will give a comprehensive final exam during the assigned final exam period.

Commonality: All instructors will use the same textbook and cover all topics in the topical outline. A graphing calculator will be required for this course. Either the TI-83 or the TI-84 line of calculators is recommended; any other graphing calculator will need to be approved by the instructor.