Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2020

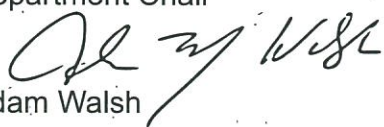**Type of Action:**

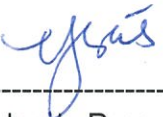|	
__	New
X	Modification
__	Move to Inactive (Stop Out)
__	Cancellation

Course Alpha and Number: MA162

Course Title: Trigonometry

Reason for initiating, <u>revising</u>, or canceling:
The course is being modified to reflect a change in assessment measures, student learning outcomes, prerequisite and update textbook.

Kathleen Winkfield

Proposer   2.25.2022

                                                                            Date

Velma C. De Leon Guerrero

Department Chair   2/28/2022

                                                                            Date

Adam Walsh

Language & Format Review Specialist   02.28.22

                                                                            Date

Ajani Burrell

Academic Council Chair   2.25.2022

                                                                            Date

Vilma S. Reyes

Interim Dean of Academic Programs and Services   2.28.2022

                                                                            Date

1. Department
Science, Mathematics, Health, and Athletics

2. Purpose
The purpose of this course is to extend student proficiency to the full range of elementary mathematical functions, definitions and principles of trigonometry, and their applications to problem solving. This course, in conjunction with MA161, is intended to provide a solid basis for those who wish to transfer to a four-year institution or to continue into higher mathematics.

3. Description

A. Required/Recommended Textbook(s) and Related Materials
Required:

McKeague, Charles P. and Mark D. Turner (2017). *Trigonometry, 8th edition.* Boston, MA, Cengage Learning.

TI-82, TI-83, or TI-89 graphing calculator

B. Contact Hours
1. **Lecture:** 4 per week / 60 per semester
2. **Lab:** 0
3. **Other:** None

C. Credits
1. **Number:** 4
2. **Type:** Regular Degree Units

D. Catalogue Course Description
This course is to extend student proficiency to the full range of elementary mathematical functions, definitions and principles of trigonometry, and their applications to problem solving. Topics covered include the six trigonometric functions, complex numbers, polar coordinates, and the graphs and inverses of trigonometric functions. The use of new technologies for the discovery of mathematical relationships are emphasized throughout. This course, in conjunction with MA161, is intended to provide a solid basis for those who wish to transfer to a four-year institution or to continue into higher mathematics. A TI-82 or higher graphing calculator is required. Prerequisite: A "C" grade or better in MA161 or the instructor's permission.

E. Degree or Certificate Requirements Met by Course
A "C" grade or higher satisfies the core course requirement in mathematics for an NMC associate-level degree program.

F. Course Activities and Design
Course activities include lecture, discussions, homework assignments, tests, quizzes, and a comprehensive final exam.

4. Course Prerequisite(s); Concurrent Course Enrollment; Required English/ Mathematics Placement Level(s)
Prerequisites: A "C" grade or higher in MA161 or instructor's permission
Concurrent Course Enrollment: None
English Placement Level: EN101
Mathematics Placement Level: MA162

5. Estimated Cost of Course; Instructional Resources Needed
Cost to the Student: tuition for a 4-credit course, cost of textbook, a TI-82/83/89 graphics calculator with manual, and instructor's edition textbook with supplemental materials.

Cost to NMC: Instructor's salary; a classroom.

Instructional resources needed for this course include: chalk and chalkboard, or whiteboard and markers with erasers. An electronic projection device and television or other viewing device for calculator demonstrations. A TI-82, TI-83, or TI-89 graphing calculator with manual, and instructor's edition textbook with supplemental materials.

6. Method of Evaluation
Evaluation methods will include quizzes, tests, homework assignments, and a comprehensive final exam. NMC's grading and attendance policies will be followed.

7. Course Outline

This is a topical outline and does not necessarily indicate the sequence in which the material will be presented.

1.0 The Six Trigonometric Functions
    1.1 Angles, degrees, and special triangles
    1.2 The rectangular coordinate system
    1.3 Trigonometric functions
    1.4 Identities

2.0 Right-Triangle Trigonometry
    2.1 Calculators and trigonometric functions of an acute angle
    2.2 Solving right-triangles
    2.3 Applications
    2.4 Vectors: a geometric approach

3.0 Radian Measure
    3.1 Reference angle
    3.2 Radians and degrees
    3.3 Circular functions
    3.4 Arc length and area of a sector
    3.5 Velocities

4.0 Graphing and Inverse Functions
    4.1 Basic graphs
    4.2 Amplitude, reflection, and period
    4.3 Vertical and horizontal translations
    4.4 Other trigonometric functions
    4.5 Finding an equation from its graph
    4.6 Graphing combinations of functions
    4.7 Inverse trigonometric functions

5.0 Identities and Formulas
    5.1 Proving identities
    5.2 Sum and difference formulas
    5.3 Double-angle formulas
    5.4 Half-angle formulas
    5.5 Additional identities

6.0 Equations
    6.1 Solving trigonometric equations
    6.2 Trigonometric equations involving multiple angles
    6.3 Parametric equations and graphing

7.0 Triangles
    7.1 The law of sines
    7.2 The law of cosines
    7.3 The ambiguous case
    7.4 The area of a triangle
    7.5 Vectors: an algebraic approach
    7.6 Vectors: the dot product

8.0 Complex Numbers and Polar Coordinates
    8.1 Complex numbers
    8.2 Trigonometric form for complex numbers
    8.3 Products and quotients in trigonometric form
    8.4 Roots of a complex number
    8.5 Polar coordinates
    8.6 Equations in polar coordinates and their graphs

8. Instructional Goals

The course will introduce students to:

1.0 The Six Trigonometric Functions;

2.0 Right-Triangle Trigonometry;

3.0 Radian Measure;

4.0 Graphing and Inverse Functions;

5.0 Identities and Formulas;

6.0 Equations;

7.0 Triangles; and

8.0 Complex Numbers and Polar Coordinates.

9. Student Learning Outcomes

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

1.0 Demonstrate the ability to apply techniques of mathematical modeling and problem solving application problems involving trigonometric functions and equations;

2.0 Demonstrate a sufficient level of competence in problem-solving strategies as applied to right-triangle trigonometry;

3.0 Differentiate between radians and degrees to calculate trigonometric functions, arc lengths, arc sectors, and velocities;

4.0 Graph trigonometric and inverse functions manually and with calculators;

5.0 Demonstrate the ability to solve trigonometric identities;

6.0 Solve trigonometric and parametric equation involving multiple angles and real-life applications;

7.0 Use the law of sines and cosines to calculate areas of triangles and vectors; and

8.0 Use the trigonometric form of complex numbers and polar coordinates to graph an equation in polar coordinates.

10. Assessment Measures of Student Learning Outcomes

Assessment of student learning may include, but not be limited to, the following:

1.0 Quizzes;

2.0 Chapter Tests;

3.0 Homework Assignments; and

4.0 Final Comprehensive Examination