

**Northern Marianas College**  
**CURRICULUM ACTION REQUEST**

**Effective Semester / Session:** Spring 2014

**Type of Action:**

New  
 Modification  
 Cancellation

**Course Alpha and Number:** MA 162

**Course Title:** College Trigonometry

**Reason for initiating, revising, or canceling:**

The course guide is being modified to reflect changes in the college catalog and student learning outcomes.

  
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11/26/13

Alex Nikolaychuk

Proposer

Date

  
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Velma C. Deleon Guerrero

11.26.2013

Interim Department Chair

Date

  
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Barbara K. Merfalen

11.26.13

Dean of Academic Programs and Services

Date

# Northern Marianas College

## Course Guide

Course: MA 162 Trigonometry

1. **Department:** Sciences, Mathematics, Health & Athletics

2. **Purpose**

The purpose of this course is to extend student proficiency to the full range of elementary mathematical functions and their applications. Topics covered include complex numbers, polar coordinates, and the graphs and inverses of trigonometric functions. Problems solving and the use of new technologies for the discovery of mathematical relationships are emphasized throughout. This course, in conjunction with MA 161, 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: Aufman, Barker, Nation, College Trigonometry, 3<sup>rd</sup> edition, Houghton Mifflin Co., Boston, MA, 1997.

Readability level: Grade 10.8.

B. **Contact Hours**

1. **Lecture:** 4 hours per week / 60 per semester
2. **Lab:**
3. **Other:**

C. **Credits**

1. **Number:** 4
2. **Type:** Regular degree units

D. **Catalogue Course Description**

This course is designed to extend student proficiency to the full range of elementary mathematical functions and their applications. Topics covered include complex numbers, polar coordinates, and the graphs and inverses of trigonometric functions. Problem solving and the use of new technologies for the discovery of mathematical relationships are emphasized throughout. This course, in conjunction with MA 161, is intended to provide a solid foundation for those who wish to continue into higher mathematics. Prerequisite: A "C" grade or better in MA 161, or the instructor's permission; EN 093/094. (Offered Fall)

E. **Degree or Certificate Requirements Met by Course**

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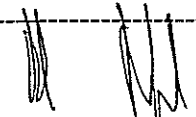
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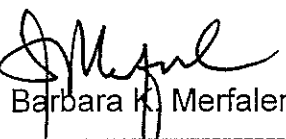
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A "C" grade or higher satisfies the elective course requirement in mathematics for an NMC associate-level degree program.

## **F. Course Activities and Design**

Course activities include lecture, group discussions, homework assignments, viewing relevant audio-visual material, calculator exploration, tests, quizzes, and a comprehensive final exam. Students will be required to participate fully in class discussions, student projects, writing activities, and other course assignments, depending upon the individual instructor.

## **4. Course Prerequisite(s); Concurrent Course Enrollment; Required English/Mathematics Placement Level(s)**

Prerequisites: A "C" grade or higher in MA 161, or instructor's permission.

English Placement Level: EN 093/094.

Math Placement Level: MA 162

## **5. Estimated Cost of Course; Instructional Resources Needed**

Cost to the Student: Tuition for a 4-credit course; cost of textbook and graphing calculator.

Cost to the College: Instructor's salary.

Instructional resources needed for this course include: a classroom equipped with chalk and chalkboard, or whiteboard, and eraser. An electronic projection and device and television and other viewing device for calculator demonstrations. A TI 82/83/89 graphic calculator with a manual and instructor's edition textbook with supplemental materials.

## **6. Method of Evaluation**

Students grades will be based on the regular letter grade system as described below:

A: Excellent- grade points: 4.0;

B: Above average- grade points: 3.0;

C: Average- grade points: 2.0;

D: Below average- grade points: 1.0;

F: Failure- grade points: 0.0.

NMC's grading and attendance policies will be followed.

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### 7. Course Outline

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

#### 1.0 Angles

- 1.1 Radian and degree measure
- 1.2 Angle measure
- 1.3 Reference angles
- 1.4 Geometry of triangles
- 1.5 Solving right and oblique triangles
- 1.6 The unit circle

#### 2.0 Teaching/tutoring strategies

- 2.1 Trigonometry functions
- 2.2 Relationships between trigonometric functions
- 2.3 Inverse trigonometric functions

#### 3.0 Additional Trigonometric Topics

- 3.1 Law of sines
- 3.2 Law of cosines
- 3.3 Vectors
- 3.4 Application of the following: law of sines, law of cosines, and vectors.
- 3.5 Area formulas, area of a sector
- 3.6 Sum and difference formulas
- 3.7 Arc length
- 3.8 Multiple-angle and product-to-sum formulas
- 3.9 Angular velocity

#### 4.0 Graphs

- 4.1 Graphs of trigonometric functions
- 4.2 Expansion and translation of sinusoidal modeling

#### 5.0 Equations and Identities

- 5.1 Plane curves and parametric equations
- 5.2 Trigonometric equations
- 5.3 Trigonometric identities
- 5.4 Composite angle identities

#### 6.0 Complex Numbers and Polar Coordinates

- 6.1 Complex numbers

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- 6.2 Trigonometric form of complex numbers
- 6.3 Polar equations and their graphs
- 6.4 DeMoivre's theorem

## 8. Instructional Goals

This course will introduce students to:

- 1.0 The principles of problem solving strategies as applied to classical trigonometry;
- 2.0 The vocabulary definitions and language of classical trigonometry;
- 3.0 The uses of and different systems of measuring angles;
- 4.0 The theory and application of trigonometric functions;
- 5.0 Properties and identities of trigonometric functions;
- 6.0 Graphs of trigonometric functions;
- 7.0 Advanced techniques of mathematical modeling and problem solving;
- 8.0 The theory and applications of complex numbers; and
- 9.0 Trigonometric concepts using technology.

## 9. Student Learning Outcomes

Upon successful completion of course, the student will be able to:

- 1.0 Demonstrate a sufficient level of competence in problem-solving strategies as applied to classical trigonometry to successfully and effectively answer such questions verbally and on examinations;
- 2.0 Demonstrate the ability to apply techniques of mathematical modeling and problem solving application problems involving trigonometric functions and equations;
- 3.0 Understand and effectively use the vocabulary and language of classical trigonometry, and know the definitions of trigonometric terminology as applied to:
  - a) trigonometric graphs, functions, co-functions, and identities;
  - b) angle classification and degree measure;

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- c) arc lengths and radians;
  - d) polar and parametric equations;
  - e) complex numbers and conic sections;
  - f) vectors and trigonometric equations; and
  - g) the law of sines and the law of cosines.
- 4.0 Demonstrate the ability to think analytically, organizing and expressing thoughts in a clear, concise, coherent manner in order to derive and verify trigonometric identities, solve trigonometric equations, and write harmonic motion equations using;
- a) trigonometric graphs, functions, cofunctions, and identities;
  - b) angle and degree measure;
  - c) arc lengths and radians;
  - d) polar and parametric equations;
  - e) complex numbers and conic sections;
  - f) vectors and trigonometric equations; and
  - g) the law of sines and the law of cosines.
- 5.0 Differentiate between radians and degrees, and be able to use either when measuring or working with angles;
- 6.0 Apply trigonometric identities, graphs of functions, and equations to real-life application problems such as determining distance through triangulation and when finding the amplitude, frequency and period of harmonic motion;
- 7.0 Be familiar with all the trigonometric identities and know how to use them in conjunction with the properties of functions;
- 8.0 Use calculators to graph trigonometric functions in polar, parametric and rectangular form and to convert between polar, parametric and rectangular equations; and
- 9.0 Recognize the trigonometric form of complex numbers and use them in their relationship to their rectangular form, including applying De Moivre's Theorem.
- 10. Assessment Measures**  
Assessment of student learning may include, but not be limited to, the following:



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- 1.0 Periodic testing and a final comprehensive examination to evaluate the student's knowledge and abilities in cognitive reasoning and the interpretation, identification, comprehension, calculation and application of the basic concepts of trigonometry.
- 2.0 A research project using the basic principles of trigonometry that demonstrates an understanding of the nature of trigonometry; and may include graphical modes of an interpretive nature.
- 3.0 A student presentation that illustrates the relationship between trigonometry and science, engineering, architecture and other such real-life practical application disciplines.

