

College of San Mateo
Official Course Outline

1. COURSE ID: MATH 130 **TITLE:** Analytical Trigonometry

Units: 4.0 units **Hours/Semester:** 64.0-72.0 Lecture hours; and 128.0-144.0 Homework hours

Method of Grading: Letter Grade Only

Prerequisite: MATH 120 or placement by other college approved methods.

Recommended Preparation:
MATH 115

2. COURSE DESIGNATION:

Degree Credit

Transfer credit: CSU

AA/AS Degree Requirements:

CSM - COMPETENCY REQUIREMENTS: C1 Math/Quantitative Reasoning Basic Competency

CSM - GENERAL EDUCATION REQUIREMENTS: E2b. Communication and Analytical Thinking

CSU GE:

CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 -
Mathematics/Quantitative Reasoning

3. COURSE DESCRIPTIONS:

Catalog Description:

Trigonometric functions of real numbers and angles, their graphs and periodicity; reduction formulas; functions of multiple angles; identities and equations; radian measure; inverse functions; and solution of triangles.

4. STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

1. State and apply correctly the definitions (unit circle, right triangle, and x - y - r), values for key angles, properties (e.g. periodicity and domain and range), basic identities for the six trig functions, laws of sine and cosine, and inverse functions.
2. Work with and apply the algebraic relationships among the six trig functions: use algebra and identities to derive other identities, verify identities, simplify expressions, and solve trigonometric equations.
3. Solve right triangles using right triangle definitions of trig functions, and oblique triangles using the laws of sines and cosines
4. Produce and interpret graphs of sine and cosine functions, with correct amplitude, period, phase shift, and vertical shifts.

5. SPECIFIC INSTRUCTIONAL OBJECTIVES:

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

1. State and apply correctly the definitions (unit circle, right triangle, and x - y - r), values for key angles, properties (e.g. periodicity and domain and range), and basic identities, for the six trig functions.
2. Work with and apply the algebraic relationships among the six trig functions: use algebra and identities to derive other identities, verify identities, simplify expressions, and solve trigonometric equations.
3. Solve right triangles using right triangle definitions of trig functions, and oblique triangles using the laws of sines and cosines
4. Solve applied trigonometry problems involving triangles or periodic behaviors.
5. Produce and interpret graphs of sine and cosine functions, with correct amplitude, period, phase shift, and vertical shift.
6. Demonstrate understanding of inverse trig functions and their applications.
7. Model periodic phenomena using sine and cosine functions.
8. State solutions to application problems in context and recognize inappropriate or impossible answers.
9. Follow and demonstrate understanding of mathematical exposition [e.g. text readings, handouts, and on-line resources].
10. Organize work in a logical, clearly stated order, correctly using mathematical symbols and language.

6. COURSE CONTENT:

Lecture Content:

1. **Review of Algebra and Geometry necessary for the study of Trigonometry (as needed). Topics may**

include.

- A. **Similar triangles**
- B. **Parallel line postulates and theorems**
- C. **Quadratic equation**
- D. **Rationalization of radicals**
- E. **Simplification of rational expressions**
2. **Angles and the Trigonometric Functions**
 - A. Angles and Degree Measure
 - B. Radian Measure, Arc Length, and Area
 - C. Angular and Linear Velocity
 - D. The Trigonometric Functions
 - E. The Fundamental Identity and Reference Angles
 - F. Right Triangle Trigonometry
3. **Graphs of the Trigonometric Functions**
 - A. Graphs of the Sine and Cosine Functions
 - B. **b.** Graphs of the Tangent and Cotangent Functions
 - C. **c.** Graphs of the Secant and Cosecant Functions
 - D. **d.** Combining Functions
4. **Trigonometric Identities**
 - A. Basic Identities
 - B. Verifying Identities
 - C. Sum and Difference Identities for Cosine
 - D. Sum and Difference Identities for Sine and Tangent
 - E. Double-Angle and Half-Angle Identities
 - F. Product and Sum Identities
5. **Solving Trigonometric Equations**
 - A. Inverse Trigonometric Functions
 - B. Sine, Cosine, and Tangent Equations
6. **Applications of Trigonometry**
 - A. The Law of Sines
 - B. The Law of Cosines
 - C. May include additional topics: Area of a Triangle; Vectors; Complex numbers; polar coordinates

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Discussion
- C. Other (Specify):
 - a. Out-of-class assignments: students will need to complete assigned problems and projects.
 - b. Reading assignments: Instructor will assign text readings prior to discussion of a topic in class.
 - c. Writing assignments: a. Students will submit written homework assignments. b. Students may be assigned papers including mathematical modeling.
 - d. Critical thinking: a. Lecture/discussion to understand problem solving process b. Students will practice critical thinking in small group problem-solving c. Students will evaluate proposed solutions in light of constraints of the problem e. Resources available on CD and the internet may be used to augment the text.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students will submit written homework assignments. Students may be assigned papers including mathematical modeling.

Reading Assignments:

Instructor will assign text readings prior to discussion of a topic in class.

Other Outside Assignments:

Students will need to complete assigned problems and projects.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Exams/Tests
- C. Group Projects

D. Homework

E. Quizzes

- F. a. Written individual assignments or journals- to demonstrate individual student progress toward objectives
b. Small group presentations and projects- to demonstrate student participation in problem solving process
c. Written exams and quizzes - to reflect student knowledge vocabulary, concepts, and application of concepts to problem solving as presented in lectures and discussion, small group sessions, and text readings. d. Comprehensive Final Examination - to reflect student knowledge of vocabulary, concepts, and applications of concepts to problem solving as presented in lectures and discussions, small group sessions, and text readings. e. Participation - to reflect student involvement in class discussions, small group sessions and presentations, etc

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

- A. Lial, Hornsby, Schneider Daniels. *Trigonometry*, ed. Pearson, 2017

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Course Originator: Christopher Walker