MATH102+ : Trigonometry with Support

General Information

Author:	• Suzanne Palermo
Course Code (CB01) :	MATH102+
Course Title (CB02) :	Trigonometry with Support
Department:	MATH
Proposal Start:	Spring 2025
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	Yes
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000645359
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	07/16/2024
Last Cyclical Review Date:	04/01/2020
Course Description and Course Note:	MATH 102+ is a course in plane trigonometry with a built-in support lab component. The course emphasizes the analytic aspects of the subject. Topics include trigonometric functions of any angle, trigonometric identities, half-angles, trigonometric equations, applications of trigonometric functions, functions, complex numbers, and polar and parametric equations. The support lab topics include plane geometry, solving algebraic equations, simplifying algebraic expressions, coordinate plane, graphing techniques and basics of Trigonometry.
Justification:	Content Change
Academic Career:	• Credit
Mode of Delivery:	
Author:	
Course Family:	

Academic Senate Discipline

Primary Discipline:	• Mathematics
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to CSU only

Transferability Status

Approved

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B4-Mathematics/Quantitative Reasoning	Mathematics/Quantitative Reasoning	Approved	08/29/2022	No Comparable Course defined.

C-ID	Area	Status	Approval Date	Comparable Course
MATH	Mathematics	Pending	No value	MATH 851 - Trigonometry

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	108
Total Course Out-of-Class Hours	108
Total Student Learning Hours	216

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

☐ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	3	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	54
Studio	0
Total	108
Course Out-of-Class Hours	
Lecture	108
Laboratory	0
Studio	0
Total	108

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

MATH90 - Intermediate Algebra for BSTEM

Objectives

- Solve absolute value equations and inequalities.
- Solve linear equations and compound inequalities.
- Perform operations with polynomials.
- Simplify complex fractions.
- Perform operations with radical expressions.
- Simplify expressions with rational exponents.
- Solve rational equations.
- Solve equations with radicals.
- Find the equation of a line parallel or perpendicular to a given line.
- Solve a system of linear equations using elimination substitution.
- Solve systems of linear inequalities.
- Find the composition of two functions.
- Solve applied problems.
- Solve quadratic equations with real and complex solutions.
- Find the inverse of a function.
- Use the properties of logarithms to simplify and expand expressions.
- Solve logarithmic and exponential equations.
- Graph parabolas and circles centered at any point.
- Graph functions (linear, quadratic, exponential, logarithmic).

OR

Prerequisite

MATH90+ - Intermediate Algebra for BSTEM with Support

Objectives

- Solve absolute value equations and inequalities.
- Solve linear equations and compound inequalities.
- Perform operations with polynomials.
- Simplify complex fractions.
- Perform operations with radical expressions.
- Simplify expressions with rational exponents.
- Solve rational equations.
- Solve equations with radicals.
- Find the equation of a line parallel or perpendicular to a given line.
- Solve a system of linear equations using elimination, substitution.
- Solve systems of linear inequalities.
- Find the composition of two functions.
- Solve applied problems.
- Solve quadratic equations with real and complex solutions.
- Find the inverse of a function.
- Use the properties of logarithms to simplify and expand expressions.
- Solve logarithmic and exponential equations.
- Graph functions (linear, quadratic, exponential, logarithmic).
- Graph parabolas and circles centered at any point.

OR

Prerequisite

Placement is based on academic background or satisfactory completion of MATH 90.

Entry Standards

Entry Standards

Course Limitations

Cross Listed or Equivalent Course

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Discussion
Methods of Instruction	Demonstrations

Out of Class Assignments

- Computer or graphing calculator assignments
- Homework (e.g. problem sets)

Methods of Evaluation	Rationale
In-Class Activity (answering journal prompt, group activity)	Group assignments and projects
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	4-8 chapter examinations
Exam/Quiz/Test	A comprehensive final examination is required

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Dugopolski, Mark	Trigonometry	Pearson	2019	9780135207338

Other Instructional Materials (i.e. OER, handouts)

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Identify special triangles and their related angle and side measures.

Evaluate the trigonometric function of an angle in degree and radian measure.

Manipulate and simplify a trigonometric expression.

Solve trigonometric equations, triangles, and applications.

Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.

Evaluate and graph inverse trigonometric functions.

Prove trigonometric identities.

Convert between polar and rectangular coordinates and equations.

Graph polar equations.

Calculate powers and roots of complex numbers using DeMoivre's Theorem.

Represent a vector (a quantity with magnitude and direction) in the form <a,b> and ai+bj.

SLOs

Demonstrate the knowledge of definitions and graphs of the trigonometric functions. Expected Outcome Performance: 70.0

ILOs Core ILOs	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues
MATH Mathematics - A.A. Degree Major	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.

Verify trigonometric identities and solve trigonometric equations. Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues
MATH Mathematics - A.A. Degree Major	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.

Demonstrate the knowledge of vectors, complex numbers, and polar coordinates. Expected Outcome Performance: 70.0

ILOs Core ILOs	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues
MATH Mathematics - A.A. Degree Major	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Algebra Review (8 hours)
- The rectangular coordinate system and the distance formula
- Function notation, domain and range of a function
- Inverses of functions
- Graphs of functions using transformations of functions
- Simplified form of square roots
- Factoring
- Complex fractions

The Trigonometric Functions (8 hours)
- Definition of trigonometric functions
- Trigonometric functions of any angle
- Right triangle trigonometry and applications

Angle Measure and Graphing (8 hours)

- Angle measure (degrees and radians)
- The unit circle
- Graphs of functions involving sine, cosine, tangent, secant, cosecant, cotangent
- Rigid and nonrigid transformations of the trigonometric functions

Trigonometric Identities (9 hours)
- Fundamental trigonometric identities (reciprocal and Pythagorean identities)
- Identities involving sums and differences of two angles
- The double-angle identities
- The half-angle identities
- Sum-to-product and product-to-sum identities
- Simplify trigonometric expressions
- Prove trigonometric identities

Trigonometric Equations and the Inverse Trigonometric Functions (9 hours)
- Solving trigonometric equations
- Inverse trigonometric functions

Oblique Triangles (6 hours)
- The law of sines
- The law of cosines
- Vectors

Complex Numbers and Polar Coordinates (6 hours)
- Complex numbers and their graphs
- Trigonometric form of a complex number
- De Moivre's theorem
- Polar coordinates and equations
- Polar graphs

Total Hours: 54

Laboratory/Studio Content

Algebra Review (7 hours)
- The rectangular coordinate system and the distance formula
- Function notation, domain and range of a function
- Inverses of functions
- Graphs of common functions: line, parabola, power, root, absolute value, reciprocal
- Graphs of functions using transformations of functions
- Simplified form of square roots
- Factoring
- Complex fractions
- Fraction arithmetic

Trigonometric Functions (7 hours)
- Definition of trigonometric functions
- Trigonometric functions of any angle
- Right triangle trigonometry and applications
- Multiply simple rational expressions
- Use rational expressions in conversions
- Simplify square roots
- Use the Pythagorean Theorem to find missing sides of a right triangle
- Angle relationships
    - Supplementary angles
    - Complimentary angles
    - Corresponding angles

Angle Measure and Graphing (7 hours)
- Angle measure (degrees and radians)
- The unit circle
- Graphs of functions involving sine, cosine, tangent, secant, cosecant, cotangent
- Rigid and nonrigid transformations of the trigonometric functions
- Write equations of horizontal and vertical lines
- Perform arithmetic with fractions involving pi
- Find horizontal and vertical asymptotes for the reciprocal function
- Identify domain and range of rational functions
- Fractional parts of 2pi
- Factor out common and uncommon factors

Trigonometric Identities (8 hours)
- Fundamental trigonometric identities (reciprocal and Pythagorean identities)
- Identities involving sums and differences of two angles

- The double-angle identities
- The half-angle identities
- Sum-to-product and product-to-sum identities
- Simplify trigonometric expressions
- Prove trigonometric identities
- Multiply binomials
- Square a binomial
- Factor expressions into a product of two binomials
- Operations with rational expressions in algebra
    - Common denominator
    - Addition
    - Subtraction
    - Complex fractions
- Rationalizing denominators by multiplying by the conjugate

Trigonometric Equations and the Inverse Trigonometric Functions (9 hours)

- Solving trigonometric equations
- Inverse trigonometric functions
- Review composition of functions as it relates to inverse functions
- Recognize trigonometric identities
- Solve proportions for a variable
- Solve for a variable in an algebraic equation
- Solve quadratic equations by factoring
- Solve quadratic equations by using the square root property
- Solve quadratic equations by using the quadratic formula
- Squaring both sides of an equation and getting extraneous roots
- Domain and range of the trigonometric functions
- Recognize trigonometric values of special angles

Oblique Triangles (6 hours)

- The law of sines
- The law of cosines
- Vectors
- Solve right triangles
- Find the distance between two points with the distance formula

Complex Numbers and Polar Coordinates (6 hours)

- Complex numbers and their graphs
- Trigonometric form of a complex number
- De Moivre's theorem
- Polar coordinates and equations
- Polar graphs
- Simplify square roots with a negative radicand
- Find nth roots with 1/n notation

Affective Domain (4 hours)

- Study plans
- Mindset (growth, resilience, hardiness and grit)
- Reading and cognitive techniques
- Study and test taking skills

Total Hours: 54

Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

Yes

GCC Major Requirements

Mathematics

GCC General Education Graduation Requirements

Communication and Analytical Thinking

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value