Cerro Coso College

Course Outline of Record Report

05/07/2020

MATHC142 : Precalculus: Trigonometry

General Information

Author (s):	• Steven Rogers • Bernsten, Dean • Bonner, Michael • Slovacek, Joseph • Kessler, Jaclyn • Martin, Jorge
Course Code (CB01) (CB01) :	MATHC142
Course Title (CB02) (CB02) :	Precalculus: Trigonometry
Department:	Mathematics
Proposal Start:	Fall 2020
TOP Code (CB03) :	(1701.00) Mathematics, General
SAM Code (CB09) (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) (CB00) :	CCC000323321
Curriculum Committee Approval Date:	02/07/2020
Board of Trustees Approval Date:	03/12/2020
External Review Approval Date:	03/12/2020
Course Description:	An intensive study of trigonometric and inverse trigonometric functions and the graphical representations of these functions. This course includes solving trigonometric equations, verifying identities, and solving triangles in the plane and on the sphere. Topics also include complex numbers, DeMoivre's theorem, analytic geometry in two and three dimensions, polar coordinates, and vectors. Applications are included.
Submission Type:	Mandatory Revision The SLOs and name of the course are being changed.This course had the SLOs assessed in Fall 2018 and Spring 2019. The results of the assessments have no impact on this revision. The following changes were made: matched the course to a c-ID descriptor, reworded the course description, selected grade options, added examples to the methods of instruction and methods of evaluation, textbook updated, cleaned up the methods of instruction, added distance ed to methods of evaluation, revised SLOs to match the c-ID descriptor, added objectives.

Faculty Minimum Qualifications

Master Discipline Preferred:	• Mathematics
Alternate Master Discipline Preferred:	• Chemistry • Engineering • Physics/Astronomy
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline:	No value

Course Formerly Known As

Course Formerly Known As

Trigonometry

Course Development Options

Basic Skills Status (CB08) (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13) (CB13)

Course is not a special class.

Grade Options

- Pass/No Pass
- Letter Grade methods

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior to College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type
CC Liberal Arts: Mathematics & Science	A.A. Degree Major
CSU General Education (CSU GE Breadth)	CSU General Education (CSU GE Breadth)
Liberal Arts: Mathematics & Science Associate in Arts Degree	Liberal Arts: Mathematics & Science Associate in Arts Degree

Transferability & Gen. Ed. Options

Transferability

Transferable to CSU only

Transferability Status

Approved

Cerro Coso General Education Requirements	Categories	Transferability Status	Comparable Course
Area 4.2	Language & Rationality Analytical Thinking	Approved	No Comparable Course defined.

CSU General Education Certification	Categories	Transferability Status	Comparable Course
Area B.4	Scientific Inquiry & Quantitative Reasoning Mathematics / Quantitative Reasoning	Approved	No Comparable Course defined.

C-ID	Categories	Transferability Status	Comparable Course
Mathematics	C-ID discipline	Pending	MATH 851

Units and Hours

Summary

Minimum Credit Units (CB07) (CB07)	4	**Total Course In-Class (Contact) Hours**	72	**Total Student Learning Hours**	216
Maximum Credit Units (CB06) (CB06)	4	**Total Course Out-of-Class Hours**	144	**Faculty Load**	-

Credit / Non-Credit Options

Course Credit Status (CB04) (CB04)	Course Non Credit Category (CB22) (CB22)	Non-Credit Characteristics
Credit - Degree Applicable	Credit Course.	No value

Course Classification Code (CB11) (CB11)	Funding Agency Category (CB23) (CB23)	
Credit Course.	Not Applicable.	☐ Cooperative Work Experience Education Status (CB10) (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	4	8
Lab Hours	-	-
Activity Hours	-	-

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	72
Lab	-
Activity	-

Total	72

Course Out-Of-Class Hours	
Lecture	144
Lab	-
Activity	-
Total	144

Time Commitment Notes for Students

Approximately 8 hours of study outside of class per week

Faculty Load

Extra Duty: -

Faculty Load: -

Units and Hours - Weekly Specialty Hours

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

Requisites

Prerequisite

MATHC055 - Intermediate Algebra

Outcomes

- Consistently perform signed number operations correctly.
- Demonstrate proficiency with operations of algebraic fractions.
- Use the rules of exponents and radicals to simplify expressions and solve equations.
- Recognize the difference between functions and non-functions.
- Graph a line and write the equation of a line.
- Recognize and graph at least one quadratic - parabola, circle, ellipse, or hyperbola.
- Solve a linear system of equations by at least two of the following methods: graphing, substitution, addition elimination, Cramer's rule.
- Solve quadratic equations by at least two of the following methods: factoring, completing the square, quadratic formula, graphing calculator.
- Graph exponential and logarithmic functions.
- Use the properties of exponential and logarithmic functions to solve equations.
- Set up and solve word problems related to the skills above.

AND

Advisory

MATHC141 - College Algebra

Outcomes

- Use function notation, perform function evaluation, and apply composition of functions.
- Demonstrate how to find the domain of a function and the inverse of a one-to-one function.
- Recognize the equations of lines, conics, and rational functions; describe their graphs and use their properties.
- Recognize and demonstrate the interrelationships of transformations, symmetry, odd/even, maximum/minimum, asymptotes, and finding roots of polynomial functions by algebraic and calculator methods.
- Recognize the equations of exponential functions and logarithmic functions, describe their graphs and use their properties algebraically and via calculator methods.
- Use arithmetic and geometric sequences in applications.
- Perform basic operations with matrices and determinants; solve systems of equations by multiple methods.
- Find limit values through exploratory numerical methods and through application of basic algebraic principles.
- Apply multiple approaches to problem solving, using algebraic, graphical, and numerical methods to solve applied problems in other areas of mathematics, natural sciences, computer graphics, and computer animation.

Entrance Skills

Skill	Content Review
No value	No value

Limitations on Enrollment

Limitation	Provide Rationale
No value	No value

Specifications

Methods of Instruction	Methods of Instruction Rationale
Lecture	Example: Lecture on how to determine the amplitude and period of a sinusoidal function

Assignments

A. Daily homework assignments Example: Students work mathematics problems assigned from the text and from hand-outs to reinforce concepts and skills discussed in lecture. B. Online Course Management System Example: Assignments on CourseCompass

Methods of Evaluation	Methods of Evaluation Rationale
Participation	A. In-class assignments Example: Students solve equations involving inverse trigonomrtric functions.
Tests	B. Weekly Quizzes Example: Students use transformations to graph a cosine function. C. Chapter Exams Example: A chapter exam on analytic trigonometry

Distance Education Description: how outcomes are evaluated	D. Proctored online exams Example: A chapter exam on analytic trigonometry

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Sullivan	Pre-Calculus 11th Edition	Prentice Hall Publishing Company	2019	9780135189771

Other Instructional Materials

No Value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Interrelate the multiple definitions of the trigonometric functions and their inverses.

Determine the appropriate trigonometric ratio or law to apply to solve problems with triangles.

Use the radian measure effectively in conversions and in applying formulas to solve problems.

Analyze trigonometric functions and their graphs using the concepts of amplitude, period, phase and vertical shifts and apply these ideas to real-world problems.

Recognize and verify or prove trigonometric identities.

Analyze trigonometric equations to determine what combination of algebra and identities will lead to a solution.

Apply trigonometry to operations with complex numbers.

Solve problems and graph equations of conic sections in rectangular and polar coordinate systems in two and three dimensions.

Identify and solve problems using parametric equations and vectors in the plane and in space.

Determine the appropriate trigonometric ratio or law to apply to solve problems with triangles.

CSLOs

Graph the basic trigonometric functions and apply changes in period, phase, and amplitude to generate new graphs.	Expected SLO Performance: 70.0
Evaluate and graph inverse trigonometric functions.	Expected SLO Performance: -
Solve trigonometric equations, triangles, and applications.	Expected SLO Performance: 70.0
Recognize and verify or prove trigonometric identities.	Expected SLO Performance: 70.0
Calculate powers and roots of complex numbers using DeMoivre's Theorem.	Expected SLO Performance: 70.0
Convert between polar and rectangular coordinates and equations and graph polar equations.	Expected SLO Performance: 70.0
Represent a vector (a quantity with magnitude and direction) in the form <a,b> and ai+bj.	Expected SLO Performance: 70.0

Outline

Outline

The Mathematics Department has adopted the following best practices for teaching this course: offering or awarding extra-credit is forbidden, the allowance of multiple attempts at exams is forbidden, and an approved on-site proctor for online course exams is required.
A. The Trigonometric Functions
1. Review of rectangular coordinate system and the Pythagorean Theorem
2. Standard position for angles, positive, negative, and coterminal angles
3. Definitions of the six trigonometric functions using x, y, and r and proof of the values for the quadrantal angles
4. Reciprocal identities, function sizes, and signs in the quadrants

B. Acute Angles and Right Triangles
1. Definitions of the trigonometric identities using side opposite, side adjacent; and hypotenuse, and introduction of cofunctions
2. Trigonometric values based on the 30-60-90 and 45-45-90 reference triangles
3. Reference angles and their uses
4. Solving right triangles
5. Applications of right triangles, including angle of elevation, angle of depression, and bearing

C. Radian Measure and Circular Functions
1. Conversions between degrees and radian measure systems
2. Length of arc and area of sector

3. Definition of the circular functions and the use of tables
4. Linear and angular velocity

D. Graphs of the Trigonometric Functions
1. Graphs of sine and cosine, with variations in period and amplitude
2. Graphs of tangent, cotangent, secant, and cosecant
3. Vertical shifts and phase shifts
4. Graphing by addition of ordinates
5. Applications of graphs of sinusoids

E. Trigonometric Identities
1. Reciprocals, quotients, Pythagorean identities, negative angles
2. Verifying and simplifying trigonometric identities
3. Sum and difference identities for sine, cosine, and tangent
4. Double, half-angle, and power-reducing identities
5. Sum and product identities

F. Inverse Trigonometric Functions
1. Review of inverse functions
2. Defining the inverse trigonometric functions
3. Methods of solving trigonometric equations
4. Solving trigonometric equations with multiple angles
5. Solving Inverse trigonometric equations

G. Triangles and Vectors
1. Law of Sines, including the ambiguous case
2. Law of Cosines
3. Vector addition, subtraction, scalar multiplication
4. Applications of vectors

H. Complex Numbers
1. Review of properties of complex numbers
2. Writing complex numbers in standard form and in trigonometric form
3. Multiplication and division in trigonometric form
4. De Moivre's Theorem
5. Nth roots of a complex number

I. Polar Coordinates and Parametric Equations
1. Plotting points in the polar coordinate system
2 Polar equations and their graphs
3. Using trigonometric functions in parametric equations

J. Additional Topics in Analytic Geometry - Conic Sections
1. Parabolas
2. Ellipses
3. Hyperbolas
4. Rotations and Systems of Quadratic Equations

K. Analytic Geometry in Three Dimensions
1. The Three-Dimensional Coordinate System
2. Vectors in Space
3. The Cross Product of Two Vectors
4. Lines and Planes in Space

L. Selected Trigonometric Applications to Be Chosen From
1. Mathematics: other branches
2. Biological Sciences: e.g. general biology, anatomy, physiology, microbiology
3. Physical Sciences: e.g. chemistry, physics, geology, astronomy, oceanography
4. Computer Science: e.g. computer graphics, computer animation
5. Music

Delivery Methods

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

- Face to face
- Online (purely online no face-to-face contact)
- Online with some required face-to-face meetings ("Hybrid")
- Online course with on ground testing
- iTV – Interactive video = Face to face course with significant required activities in a distance modality

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section? Describe the ways in which instructor-student contact and student-student contact will be facilitated in the distance ed environments.

All assignments in distance education courses (online, hybrid and iTV) are the same as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually, and students in hybrid sections will submit some of their assignments virtually. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online and hybrid courses is presented virtually. Instead of onsite lectures, hybrid and online courses will use videos and written lecture notes.

As with any on-ground class, the instructor must provide substantive critiques of all submitted material and at least general responses to discussion posts. Instructor assigns the completion of math problems in a publisher site as an exercise including check figures and assistance when needed. The publisher's site will reinforce the course's SLO's.

Student-Instructor contact will include the following: discussion forums, learning management system messages, announcements, and feedback for each student's work.
Student-Instructor contact MAY include the following: chat/Zoom, newsgroup/discussion board, phone, and iTV.
Student-Student contact will include the following: discussion forums.
Student-Student contact MAY include the following: chat/Zoom, learning management system messages, group work, and peer reviewed projects.
Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other

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- Discussion Forums
- Message
- Chat/Instant Messaging
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Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

For online courses a Pearson access code may be required. There is a toll free student technical support line included with the access code.

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

- Learning management system
- Publisher course with learning management system interface.

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

Faculty will use the Canvas accessibility checker, along with other resources provided by our Distance Education Director, to ensure all learning materials are accessible, including but not limited to documents, pdfs, OERs, external websites, and videos.

class_size Hybrid 45