MATH 005: TRIGONOMETRY

Originator
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Justification / Rationale
AB 706 statement update.

Effective Term
Fall 2019

Credit Status
Credit - Degree Applicable

Subject
MATH - Mathematics

Course Number
005

Full Course Title
Trigonometry

Short Title
TRIGONOMETRY

Discipline

Disciplines List
Mathematics

Modality
Face-to-Face

Catalog Description
This course is the first of a two semester sequence preparing students for calculus. In this course, students will study functions with an emphasis on the trigonometric functions along with topics in analytic geometry. Topics will include a review of plane and coordinate geometry, functions including function notation, transformations and inverses, definitions and graphs of the trigonometric functions, modeling periodic behavior, solving triangle problems with the Law of Sines and Cosines, the conic sections, parametric equations and vectors.
Note: All students now can enroll in this transfer-level course without completing posted requisites. Please refer to AB 705 (under How do I enroll in courses at COD?) or see a Counselor.

Schedule Description
This course is the first of a two semester sequence preparing students for Calculus. In this course, students will study functions with an emphasis on the trigonometric functions along with topics in analytic geometry.
Prerequisite: MATH 040 or MATH 049
Advisory: ENG 061 & MATH 030

Lecture Units
5

Lecture Semester Hours
90

Lab Units
0

In-class Hours
90

Out-of-class Hours
180

Total Course Units
5

Total Semester Hours
270

Prerequisite Course(s)
MATH 040 or MATH 049
Advisory: ENG 061 & MATH 030

Required Text and Other Instructional Materials

Resource Type
Book

Author
Stewart, James, Redlin, Llothar, Watson, Saleem

Title
Precalculus

Edition
7th

Publisher
Cengage

Year
2015

College Level
Yes

Flesch-Kincaid Level
12

ISBN #
9781305071759

Class Size Maximum
35

Entrance Skills
Interpret slope as a constant rate of change.

Prerequisite Course Objectives
MATH 040-Interpret slope as a rate of change.
MATH 049-Interpret slope as a rate of change, in preparation for generalizing the rate of change to the derivative in the Calculus course.

Entrance Skills
Recognize when a table, graph, or equation is linear and create a linear model in the form of a table, graph, or equation.

Prerequisite Course Objectives
MATH 040-Recognize when a table, graph, or equation is linear.
MATH 049-Create and comprehend a linear model in the form of a table, graph, or equation from a verbal description, using the rule of 4.

Entrance Skills

Solve systems of linear and non-linear equations.

Prerequisite Course Objectives

MATH 040-Solve 2x2 and 3x3 systems of linear equations.
MATH 049-Solve 2x2 and 3x3 systems of linear equations apply this to model circles, parabolas lines from given data, as a lead into generalizing to least square methods in the Calculus sequence.

Entrance Skills

Graph and find the equation of a circle.

Prerequisite Course Objectives

MATH 040-Graph and find the equation of a circle.
MATH 049-Graph and find the equation of a circle. Graph the circle to discuss the domain range of the explicit functions defined from the implicit circular relation, to generate more confidence in the language of functions for following courses.

Entrance Skills

Solve quadratic equations by factoring, completing the square or taking square roots.

Prerequisite Course Objectives

MATH 040-Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.
MATH 049-Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.

Entrance Skills

Recognize when a table, graph, or equation is quadratic and create a quadratic model with a table, graph, or equation.

Prerequisite Course Objectives

MATH 040-Recognize when a table, graph, or equation is quadratic.
MATH 049-Recognize when a table, graph, or equation is quadratic.

Entrance Skills

Graph a parabola by finding the vertex, intercepts, and other symmetric points.

Prerequisite Course Objectives

MATH 040-Graph a parabola by finding the vertex, intercepts, and other symmetric points.
MATH 049-Graph a parabola by finding the vertex, intercepts, and other symmetric points. Graph a circle by finding the "extreme points" center.

Entrance Skills

Define a function and use function notation and terminology properly (domain and range).

Prerequisite Course Objectives

MATH 040-Apply the definition of a function including function notation and terminology (domain and range).
MATH 049-Apply the definition of a function including function notation and terminology (domain and range), especially as function notation relates to a graph. Develop the ability to read a graph and precisely describe how the output variable changes wrt (with respect to) the output variable, using function notation and inequality notation.

Entrance Skills

Identify that the key characteristic of an exponential function is its constant growth (decay) factor.

Prerequisite Course Objectives

MATH 040-Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor.
MATH 049-Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor. Recognize when a table, graph or function is exponential.

Entrance Skills

Recognize and solve similar triangle problems.

Prerequisite Course Objectives

MATH 030-Independently analyze and set up application problems, thus applying problem solving techniques to new situations. Also, anticipate and check proposed solutions.

Entrance Skills

Basic knowledge about angles such as congruence of vertical angles theorem, familiarity with Pythagorean theorem.

Prerequisite Course Objectives

MATH 030-Apply the principles of deductive reasoning in geometry and its applications.

Entrance Skills

ADVISORY SKILLS:
Demonstrate critical thinking skills when reading, and participating in class discussions.

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to think critically and express ideas using various patterns of development.

Entrance Skills

Connect information gained from textbook readings and lectures to other disciplines.

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to use research skills including library resources such as books, periodicals, electronic databases and online resources such as the internet.
ENG 061-Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.

Entrance Skills

Model applications problems arising from science and engineering.

Entrance Skills

Demonstrate comprehension of rational numbers and their representation as decimals and fractions. Demonstrate the ability to judge relative sizes of rational numbers and the ability to add, subtract, multiply, and divide rational numbers without a calculator.

Entrance Skills

Demonstrate a high level of proficiency in the operations of addition, subtraction, multiplication, and division, as well as computing exponents and roots.

Course Content

1. Plane geometry review including facts and applications of angles, triangles, quadrilaterals and circles.
2. Deductive reasoning and proofs.
3. Functions including four ways of representing functions, function-notation, terminology, rates of change, and representing word problems with functions.
4. Transformations of functions.
5. The algebra of functions including the composition of functions.
6. One-to-one functions and inverse functions.
7. The trigonometric definitions using the right triangle and circular approach.
8. Solving triangles including right triangles, oblique triangles, Law of Sines, Law of Cosines, and applications.
9. Radian and degree measure including applications.
10. Trigonometric functions and their graphs, including phase shifts, amplitude, frequency, period, and translations.
11. Modeling periodic behavior using trigonometric functions.
12. Pythagorean Identities and using identities to deduce other identities.

13. Conic Sections including the characteristics of parabolas, circles, ellipses and hyperbolas in rectangular form, with graphing and applications.
14. Introduction to vectors.

Course Objectives

	Objectives
Objective 1	Apply facts about angles, parallel lines and triangles to deduce further results about a geometric figure.
Objective 2	Prove when two triangles are congruent or similar.
Objective 3	Justify the lengths of sides in an isosceles right triangle and in a 30 – 60 – 90 triangle.
Objective 4	Deduce the lengths of sides in quadrilaterals such as trapezoids and rectangles using basic definitions, Pythagorean Theorem, perimeter and/or area.
Objective 5	Calculate the measure of a central angle in a circle using the measure of the intercepted arc and calculate the areas of geometric figures involving circles.
Objective 6	Apply facts about plane geometric figures to deduce the surface area and volume of three dimensional geometric figures.
Objective 7	Use the concept of a function by identifying and describing a function graphically, numerically and algebraically.
Objective 8	Calculate the domain and range for a function expressed as a graph or an equation. From a graph, estimate the intervals where a function is increasing, decreasing and/or has a maximum or minimum value.
Objective 9	Use and interpret function notation to find “inputs” and “outputs” from the graph, table and/or an equation describing a function
Objective 10	From an equation, graph or table, calculate average rates of change by using a difference quotient or by using slopes of secant lines. Analyze average rates of change to determine the concavity of a graph.
Objective 11	Apply the six basic transformations of functions to graph translated functions, including the quadratic functions.
Objective 12	Represent a word problem (especially a geometric problem) with a function, including the use of functions to model real world applications.
Objective 13	Determine when a function has an inverse (one to one functions) and find the inverse function graphically or algebraically.
Objective 14	Form new functions through addition, subtraction, multiplication, division and composition.
Objective 15	Recognize classical and analytic definitions of the trigonometric functions. Evaluate and/or estimate trigonometric function values at angles given in degree or radian measure.
Objective 16	Solve triangles using right triangle trigonometry, the law of sines and the law of cosines.
Objective 17	Convert from radian to degree measure and vice-versa.
Objective 18	Graph the six trigonometric functions and demonstrate the ability to predict the corresponding graphic behavior of changes in parameters that modify amplitude, period, and phase.
Objective 19	Use trigonometric functions to model periodic behavior.
Objective 20	Use the basic Pythagorean identities to deduce further identities.
Objective 21	Given the magnitude and direction of a vector in two-dimensional space, represent it in component form and ai+bj form. Also determine the magnitude and direction given the vector in ai+bj form.
Objective 22	Perform basic arithmetic with vectors both graphically and via the use of the ai+bj form of the vectors.
Objective 23	Analyze geometrically and manipulate algebraically the equations and graphs of the standard and shifted conic sections (as derived from their geometric definitions) including the major/minor axes, foci, directrix, and asymptotes in rectangular form.
Objective 24	Analyze independently and set up application problems, thus applying problem solving technique to new situations. Demonstrate the ability to anticipate and check their proposed solutions.
Objective 25	Communicate effectively with the instructor and mathematical community using proper terminology verbally as well as proper written notation.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Demonstrate that previously learned fundamental skills and knowledge from arithmetic, algebra, and geometry prior learning have been maintained or restored.
Outcome 2	Demonstrate problem solving skills in application problems, with emphasis on the concepts of distance and angles.
Outcome 3	Demonstrate problem solving skills in application problems, with an emphasis on periodic phenomena.

Outcome 4	Create, analyze, and interpret graphs of trigonometric functions.
Outcome 5	Develop an appreciation for the use of proof in mathematics, with an emphasis on its use in geometry, including the ability to create mathematical proofs of geometric properties.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Demonstration, Repetition/Practice	Some class time will be spent solving problems and demonstrating effective problem solving strategies.
Technology-based instruction	Examples include graphing functions using calculators or computers.
Lecture	Lecture will be the primary method by which new material for the course is covered. Students are expected to take notes and review notes in between lecture sections.
Discussion	
Other (Specify)	

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Mid-term and final evaluations	Students will be evaluated by completing midterm exams that are made up of short answer or free response questions. Exams will consist of problems similar in nature to the homework as well as some problems that will ask students to use a myriad of ideas from the course to solve novel problems.	In Class Only
Mid-term and final evaluations	Students will be evaluated by completing a comprehensive final exam.	In Class Only
Computational/problem-solving evaluations	Students will be evaluated by completing problem sets requiring significant problem-solving skills and critical thinking.	In and Out of Class
Written homework	Students will be evaluated by completing homework assignments amounting to about ten hours per week.	Out of Class Only

Assignments

Other In-class Assignments

1. Attend classroom lectures and take notes.
2. Participate in classroom discussions to review, analyze, diagnose and evaluation various methods of solution used on their homework.
3. Complete assigned lab activities. Activities include problem solving, and exercises to improve skills and mathematical understanding.

Other Out-of-class Assignments

1. Read textbooks and supplementary assignments.
2. Complete daily assigned homework. Problems include problem solving, and exercises to improve skills and mathematical understanding.
3. Complete examinations involving problems that apply studied principles to new situations.

Grade Methods

Letter Grade Only

Comparable Transfer Course Information

University System

CSU

Campus
CSU Los Angeles

Course Number
MATH 104B

Course Title
Precalculus: Trigonometry

Catalog Year
2012

Rationale
Assist.org

COD GE
C4.B - Language and Rationality - Communication and Analytical Thinking

CSU GE
B4 - Mathematics

MIS Course Data

CIP Code
27.0101 - Mathematics, General.

TOP Code
170100 - Mathematics, General

SAM Code
E - Non-Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Transferable to CSU only

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
02/05/2019

Academic Senate Approval Date
02/14/2019

Board of Trustees Approval Date
03/15/2019

Course Control Number
CCC000291971

Programs referencing this course
Liberal Arts: Math and Science AA Degree (http://catalog.collegeofthedesert.eduundefined?key=29)