MATH M06: TRIGONOMETRY

Originator
lmai

College
Moorpark College

Discipline (CB01A)
MATH - Mathematics

Course Number (CB01B)
M06

Course Title (CB02)
Trigonometry

Banner/Short Title
Trigonometry

Credit Type
Credit

Start Term
Summer 2021

Catalog Course Description
Studies the trigonometric functions, their inverses and their graphs. Covers identities and proofs related to trigonometric expressions and solving trigonometric equations, right triangles, and general triangles using the law of cosines and the law of sines. Provides an introduction to polar coordinates, vectors, and vector operations.
Course Credit Limitations:
1) MC, CSU - completing MATH M05 and MATH M06 is the same as completing MATH M07.
2) MC, CSU - students completing MATH M05, M06, and M07 receive a maximum credit of 6 units.

Taxonomy of Programs (TOP) Code (CB03)
1701.00 - Mathematics, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
B (Transferable to CSU only)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
B - Satisfies Math/Quantitative Reasoning req (CSUGE-B B4, IGETC 2, or 4-yr)

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(E) Credit by exam, license, etc.
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
52.5
Maximum Contact/In-Class Lecture Hours
52.5

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
105
Maximum Outside-of-Class Hours
105

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
157.5
Total Maximum Student Learning Hours
157.5

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Prerequisites
MATH M03 or MATH M03B or High School Algebra II or placement as determined by college's multiple measures assessment process

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	graph a trigonometric function of the type y=A sin Bx + C.
2	use the Law of Sines or Cosines to solve a triangle.
3	solve a quadratic trigonometric equation.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	identify special triangles and their related angle and side measures.
2	evaluate the trigonometric function of an angle in degree and radian measure.
3	manipulate and simplify a trigonometric expression.
4	solve trigonometric equations, triangles, and applications.
5	graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.
6	evaluate and graph inverse trigonometric functions.
7	prove trigonometric identities.
8	convert between polar and rectangular coordinates and equations.
9	calculate powers and roots of complex numbers using DeMoivre's Theorem.
10	graph polar equations.
11	represent a vector (a quantity with magnitude and direction) in the form and ai+bj.

Course Content

Lecture/Course Content

30.00%
A. Trigonometric Functions
1. Rectangular coordinates, angles and circular/radian measure
2. Definitions of the six trigonometric functions according to the right triangle, the unit circle, and the rectangular coordinate system
3. Applications of the right triangle
4. Simplification of trigonometric expressions
5. Graphs of trigonometric functions: period, amplitude, phase shift, asymptotes

25.00%
B. Trigonometric Identities and Equations
1. Proofs of trigonometric identities
2. Sum, difference and cofunction identities
3. Double-angle and half-angle identities
4. Identities involving the sum of trigonometric functions
5. Inverse trigonometric functions, their identities, and their graphs
6. Trigonometric equations

20.00%
C. Applications of Trigonometry
1. Applications of right triangle
2. Law of Sines
3. Law of Cosines

10.00%
D. Complex Numbers
1. Complex numbers
2. Trigonometric form of complex numbers
3. DeMoivre's Theorem and applications

10.00%
E. Polar Functions
1. Introduction to polar coordinates
2. Polar equations and graphs

5.00%
F. Vectors
1. Introduction to vectors
2. Vector operations

Laboratory or Activity Content

n/a

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Objective exams
Problem-solving exams
Other (specify)
Classroom Discussion
Projects
Participation

Other

Quizzes and/or graded work will be used to evaluate students for the critical thinking skills needed to solve math problems. Problems must require students to demonstrate analytic skills and the step-bystep details required for the solution, such as identifying all steps in the verification of a trigonometric identity, or demonstrating all steps in computing the missing angles and sides of a triangle using the law of sines or the law of cosines.

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Distance Education

Lecture
Other (specify)

Specify other method of instruction

Introductory lectures to new concepts; review material from previous topics as related to the current topic; provide detailed step-by-step examples; provide practice problems to develop proper mathematical skills and techniques; provide student interaction for questions and answers; use projects and/or group work to enhance student understanding of the concepts, such as having students take actual measurements to apply trigonometric computations; and discuss
application problems.

Representative Course Assignments

Writing Assignments

homework problems selected from the trigonometry textbook where answers require a written explanation, such as describing modifications to a graph involving translations, reflections, and changes to the period and amplitude.

short answer problems on exams such as stating the results for an application problem, such as expressing lengths and widths as found by applying the law of sines or the law of cosines to measurements that occur in engineering, architecture or nature.

graded assignments: in-class and/or homework assignments requiring complete solutions using both written English and symbolic mathematical language, such as writing angle measurements in both radian and degree mode.

Critical Thinking Assignments

describing and applying the algorithmic steps for obtaining the solution to a mathematical problem, such as graphing a trigonometric function using amplitude, period, and phase shift.

comparing and contracting methods of solution to mathematical problems, such as finding the trigonometric functions for an angle using identities or using the circle method.

applying analytic techniques for solving mathematical and application problems, such as solving a triangle problem to answer an application problem.

Outside Assignments

Representative Outside Assignments

group or individual projects, such as students taking actual measurements of distances, so as to use the trigonometric functions to compute heights of trees, lamp posts, buildings and walls, or the lengths of strings and wires.

assigned reading material and homework problems from the trigonometry textbook, such as viewing diagrams of the unit circle and illustrations of the definitions of the trigonometric functions for general angles.

graded problem solving assignments, such as computations involving complex numbers and the use of De Moivre's Theorem.

additional problem sets provided by the instructor, such as practice on verifying identities.

Articulation

C-ID Descriptor Number

MATH 851

Status

Approved

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
CSU Stanislaus	MATH 1080	Trigonometry	3
CSU Fresno	MATH 5	Trigonometry	3
CSU Chico	MATH 118	Trigonometry	3
CSU Long Beach	MATH 111	Precalculus Trigonometry	3
CSU Los Angeles	MATH 104B	Precalculus: Trigonometry	4
Cal Poly Pomona	MAT 106	Trigonometry	4

Comparable Courses within the VCCCD

MATH R116 - College Trigonometry
MATH V05 - Plane Trigonometry

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

D2. Communication/Analytical Thinking
Approved

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
F1995

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B4 Mathematical/Quantitative Reasoning
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
McKeague, Charles P., and Mark Turner (2017). *Trigonometry* (8th). Brooks Cole. 9781305652224

Resource Type
Textbook

Description
Lial, Margaret, et al (2016). *Trigonometry* (11th). Pearson. 9780134306025

Resource Type
Textbook

Description
Sullivan, Michael (2015). *Trigonometry: A Unit Circle Approach* (10th). Pearson. 9780321999320

Library Resources

Assignments requiring library resources
Use of textbooks on reserve. Use of Library resources, print and online, to supplement application problems, such as identifying uses of trigonometry in physics, architecture, engineering or astronomy.

Sufficient Library Resources exist
Yes

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (1%–50% online)

Hybrid (51%–99% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Face to Face (by student request; cannot be required)	Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.
Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Face to Face (by student request; cannot be required)	Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.
Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups.
E-mail	Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class.
Other DE (e.g., recorded lectures)	Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet.
Synchronous Dialog (e.g., online chat)	Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests.

Examinations

Hybrid (1%–50% online) Modality
On campus

Hybrid (51%–99% online) Modality
On campus

Primary Minimum Qualification
MATHEMATICS

Review and Approval Dates

Department Chair
MM/DD/YYYY

Dean
MM/DD/YYYY

Technical Review
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000433537

DOE/accreditation approval date
MM/DD/YYYY