Glendale College
Course Outline of Record Report

Course ID 010428

Revision - May 2023

MATH112+ : Calculus for Business with Support

General Information

Author:	• Suzanne Palermo
Course Code (CB01) :	MATH112+
Course Title (CB02) :	Calculus for Business with Support
Department:	MATH
Proposal Start:	Fall 2023
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) :	CCC000607060
Curriculum Committee Approval Date:	05/10/2023
Board of Trustees Approval Date:	06/20/2023
Last Cyclical Review Date:	03/01/2019
Course Description and Course Note:	MATH 112+ is a one-semester course in calculus for business, management, and social science majors. This course has a built-in support lab component. Topics in this course include: techniques of differentiating; maximum-minimum problems; curve sketching; derivatives and applications of exponential and logarithmic functions; techniques of integration; and simple differential equations
Justification:	Coding/Category Change
Academic Career:	• Credit
Author:	• Suzanne Palermo

Academic Senate Discipline

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

Transferability & Gen. Ed. Options

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

IGETC Area	Area	Status	Approval Date	Comparable Course
2-Math	Mathematical Concepts and Quantitative Reasoning	Approved	08/31/2020	No Comparable Course defined.

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B4-Mathematics/Quantitative Reasoning	Mathematics/Quantitative Reasoning	Approved	08/31/2020	No Comparable Course defined.

C-ID	Area	Status	Approval Date	Comparable Course
MATH	Mathematics	Pending	No value	MATH 140 - Business Calculus

Units and Hours

Summary

Minimum Credit Units (CB07)	5.5
Maximum Credit Units (CB06)	5.5
Total Course In-Class (Contact) Hours	135
Total Course Out-of-Class Hours	180
Total Student Learning Hours	315

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.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	5	10
Laboratory Hours	2.5	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	90
Laboratory	45

Studio	0
Total	135

Course Out-of-Class Hours

Lecture	180
Laboratory	0
Studio	0
Total	180

Time Commitment Notes for Students

No value

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

Prerequisite

MATH90+ - Intermediate Algebra for BSTEM with Support (in-development)

Objectives
- Solve absolute value equations and inequalities;
- solve linear equations and compound inequalities;
- perform operations with polynomials;
- perform operations with radical expressions;
- 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 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

MATH90 - Intermediate Algebra for BSTEM (in-development)

Objectives
- Solve absolute value equations and inequalities;
- solve linear equations and compound inequalities;
- perform operations with polynomials;
- perform operations with radical expressions;
- 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 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

MATH100 - College Algebra (in-development)

Objectives
- perform operations on functions;
- find inverses of functions;
- solve equations including: linear, polynomial, radical, rational, absolute value, exponential and logarithmic;
- solve linear, absolute value, and non-linear inequalities;
- solve linear and non-linear systems of equations and inequalities;
- graph and algebraically analyze conic sections;

OR

Prerequisite

MATH111 - College Algebra for Business and Liberal Arts (in-development)

Objectives
- analyze and investigate properties of functions;
- synthesize results from the graphs and/or equations of functions;
- solve and apply equations including rational, linear, absolute value, polynomial, exponential, and logarithmic equations;
- solve linear and nonlinear systems of equations and inequalities;
- apply functions and other algebraic techniques to model real world applications;
- recognize the relationship between functions and their inverses graphically and algebraically;
- apply transformations to the graphs of functions.

OR

Prerequisite

Placement is based on academic background or satisfactory completion of MATH 111, 90, 90+ or 100.

Entry Standards

Entry Standards

No value

Specifications

Methods of Instruction

Methods of Instruction	Lecture

Methods of Instruction	Discussion

Methods of Instruction	Multimedia

Methods of Instruction	Demonstrations

Out of Class Assignments

- Homework (e.g. problem sets related to course content)
- Group assignments and projects (e.g. analyze a business' profit and loss, analyze supply and demand for a product)
- Computer or graphing calculator assignments

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	5-7 chapter examinations are required
Exam/Quiz/Test	A comprehensive final examination is required

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Lial, Margaret	Calculus with Applications	Pearson	2015	978-0-321-97942-1

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

Description	Mathematics Division generated materials
Author	No value
Citation	No value
Online Resource(s)	No value

Learning Outcomes and Objectives

Course Objectives

Demonstrate understanding of exponents, linear equations and inequalities, and functions

Differentiate various types of functions by using the product, quotient and chain rules

Find the derivatives of polynomial, rational, exponential and logarithmic functions

Use derivatives to find rates of change and tangent lines

Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is decreasing and increasing, maximum and minimum values, intervals of concavity and points of inflection

Apply the rules of differentiation to solve optimization problems

Use calculus to analyze revenue, cost and profit

Apply the calculus of exponential and logarithmic functions to application problems

Apply the various techniques of integration to definite, indefinite, and improper integrals by using the general integral formulas, integration by substitution, and other integration techniques

Analyze the marginal cost, profit and revenue when given the appropriate function

Use integration in business and economics applications

Solve separable differential equations

SLOs

Find, apply, and interpret graphic, symbolic, numerical/data, and verbal/applied representations of the derivative.   Expected Outcome Performance: 70.0

MATH Mathematics - A.A. Degree Major	Evaluate limits, derivatives and integrals.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Find, apply, and interpret graphic, symbolic, numerical/data, and verbal/applied representations of integration.   Expected Outcome Performance: 70.0

MATH Mathematics - A.A. Degree Major	Evaluate limits, derivatives and integrals.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Apply calculus to business related application problems.   Expected Outcome Performance: 70.0

MATH Mathematics - A.A. Degree Major	Evaluate limits, derivatives and integrals.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Additional SLO Information

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

No Value

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

No Value

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

Preliminaries (8)
- Algebra review
- The Cartesian Coordinate System
- Lines

Functions, Limits, and the Derivative (15)
- Functions and their graphs, including exponential and logarithmic functions
- The algebra of functions
- Functions and mathematical models
- Limits and intuitive limit definition of derivative
- One-sided limits and continuity
- Increments, tangent lines and rate of change

Differentiation (15)
- Rules of differentiation, including sum, difference, product and quotient rules
- The chain rule
- Marginal functions in economics
- Higher-order derivatives
- Implicit differentiation and related rates
- Differentials

Applications of the Derivative (16)
- Applications of the first derivative – increasing/decreasing and extrema
- Applications of the second derivative – concavity and points of inflection
- Curve sketching
- Optimization - extreme value theorem
- Optimization – applications

Exponential and Logarithmic Functions (14)
- Exponential functions
- Logarithmic functions
- Compound interest
- Differentiation of exponential functions
- Differentiation of logarithmic functions
- Exponential functions as mathematical models

Integration (15)
- Antiderivatives, indefinite integrals and the rules of integration
- Integration by substitution
- Approximating definite integral as a sum
- Area and the definite integral
- The Fundamental Theorem of Calculus
- Evaluating definite integrals
- Area between two curves
- Applications of the definite integral to business and economics

Additional Topics in Integration (7)
- Integration by parts
- Numerical integration (optional)
- Improper integrals

Total Hours=90

Laboratory/Studio Content

Laboratory Content (45)
- Geometry Review
  - Perimeter
  - Area
- Calculator use
- Exponents
  - Properties
  - Rational exponents
- Multiplication of polynomials
- Factoring polynomials
- Rational expressions
  - Zero in numerator and/or denominator
  - Working with averages
  - Difference quotients
- Equations
  - Rational equations
  - Exponential equations
- Inequalities
  - Linear
  - Non-linear
- Radicals
- Functions
  - Function notation
  - Domain and range
  - Graphing
  - Linear functions
  - Polynomial and rational functions
  - Exponential and log functions
- Systems of linear equations
- Problem solving strategies

Total Hours=45