



# COURSE OUTLINE OF RECORD

**Number:** MATH G140S

**TITLE:** Business Calculus with Support

**ORIGINATOR:** Gary Kirby

**EFF TERM:** Fall 2024

**FORMERLY KNOWN AS:**

**DATE OF**

**OUTLINE/REVIEW:** 12-05-2023

**CROSS LISTED COURSE:**

**TOP NO:** 1701.00

**CID:**

**SEMESTER UNITS:** 6.0

**HRS LEC:** 108.0

**HRS LAB:** 0.0

**HRS OTHER:** 0.0

**CONTACT HRS TOTAL:** 108.0

**STUDY NON-CONTACT HRS RECOMMENDED:** 216.0

**TOTAL STUDENT LEARNING HRS:** 324.0

## CATALOG DESCRIPTION:

This course is designed for students of business, management, and social science who need only one semester of calculus covering a variety of topics spanned over three semesters of calculus. Topics include functions, limits and continuity, differentiation, integration, graphing, and the calculus of two variables and applications of the derivative and integral. In addition, supplemental instruction will be provided in basic algebraic and trigonometric skills and concepts needed for success in Business Calculus. This course does not prepare a student to enter MATH G180 or G185.

## JUSTIFICATION FOR COURSE:

### PREREQUISITES:

- Course taught at the level of intermediate algebra or appropriate math placement.

### COREQUISITES:

### ADVISORIES:

### ASSIGNED DISCIPLINES:

Mathematics

**MATERIAL FEE:** Yes ☐ No ☒ Amount: \$0.00

**CREDIT STATUS:** Noncredit ☐ Credit - Degree Applicable ☒ Credit - Not Degree Applicable ☐

**GRADING POLICY:** Pass/No Pass ☐ Standard Letter ☒ Not Graded ☐ Satisfactory Progress ☐  
P/NP/SP Noncredit ☐ Letter Noncredit ☐

**OPEN ENTRY/OPEN EXIT:** Yes ☐ No ☒

**TRANSFER STATUS:** CSU Transferable ☒ UC/CSU Transferable ☐ Not Transferable ☐

**BASIC SKILLS STATUS:** Yes ☐ No ☒

**LEVELS BELOW TRANSFER:** Not Applicable

**CALIFORNIA CLASSIFICATION CODES:** Y - Not Applicable

**NON CREDIT COURSE CATEGORY:** Y - Not applicable, Credit Course

**OCCUPATIONAL (SAM) CODE:** E

**REPEATABLE ACCORDING TO STATE GUIDELINES:** No ☒ Yes ☐ **NUMBER REPEATS:**

**CB25 GENERAL EDUCATION STATUS:** B = CSU B4, UC IGETC 2 OR GE Math/Quant Reason w/ 4-year

**CB26 SUPPORT COURSE STATUS:** S = Support course

**REQUIRED FOR DEGREE OR CERTIFICATE:** No [ ] Yes [X]

Biology (Associate in Science for Transfer)

Economics (Associate in Arts for Transfer)

Environmental Science (Associate in Science for Transfer)

Liberal Arts: Emphasis in Business and Public Administration (Associate in Arts)

Liberal Arts: Emphasis in Computer Science and Technology (Associate in Arts)

**GE AND TRANSFER REQUIREMENTS MET:**

**COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:**

1. Calculate the elasticity of demand and interpret its implications for price manipulation.
2. Use the concepts of differentiation and marginality to optimize cost, revenue, and profit functions.
3. Use implicit differentiation and related rates concepts to solve business and economics applications.

**COURSE OBJECTIVES:**

1. Solve applicational word problems.
2. Solve conditional equations through the use of various mathematical properties.
3. Compute limits of basic functions and the limit of their sums, differences, products, and quotients using the properties of limits.
4. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule.
5. Find the derivative of polynomial, rational, exponential, and logarithmic functions.
6. Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing, decreasing, maximum and minimum values, intervals of concavity, and points of inflection.
7. Analyze the marginal cost, revenue, and profit when given an appropriate function.
8. Determine the maxima and minima in optimization problems using derivatives.
9. Compute the first and second partial derivatives of functions of two variables.
10. Apply the calculus of functions of two variables to solve real world problems.
11. Use derivatives to find rates of change and tangent lines.
12. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques.
13. Use integration in business and economics applications.

**COURSE CONTENT:**

**LECTURE CONTENT:**

- A. Skills for Success
  1. Study Skills
  2. Test-taking Skills
  3. Operations of Real Numbers
    - a. Arithmetic
    - b. Simplifying
    - c. Rounding
    - d. Summation Notation
    - e. Sets and Intervals
    - f. Ratios and Proportions
    - g. Ratios as Fractions
    - h. Solving Problems Using Proportions
  4. Linear Equations

- a. Interpret the Slope
  - b. Interpret the Vertical Intercept
  - c. Slope-intercept Form
  - d. Point-slope Form
- 5. Polynomial Functions
  - a. Solving for Roots
  - b. Completing the Square
  - c. Behavior Around Roots
  - d. Ending Behavior
- 6. Rational functions
  - a. Graphing
  - b. Holes and Vertical Asymptotes
  - c. Ending Behavior
- 7. Exponential and Logarithmic Functions
  - a. Graphing
  - b. Exponential Properties
  - c. Logarithmic Properties
  - d. Conditional Equations
- 8. Trigonometry
  - a. Trigonometric Functions
  - b. Unit Circle
  - c. Graphing
  - d. Trigonometric Identities
  - e. Conditional Equations
  - f. Inverse Trigonometric Functions
- 9. Inverse Functions
  - a. Graphical and Algebraic Properties
- 10. Solving Word Problems
  - a. Identifying Questions
  - b. Identifying Formula/Equation
  - c. Interpreting Result
- B. Functions
  - 1. Real Numbers, Inequalities, and Lines
  - 2. Exponents
  - 3. Functions
  - 4. Functions Continued
- C. Derivatives and Their Uses
  - 1. Limits and Continuity
  - 2. Rates of Change, Slopes, and Derivatives
  - 3. Sum and Difference Differentiation Rules
  - 4. The Product and Quotient Rules
  - 5. Higher-Order Derivatives
  - 6. The Chain Rule and the Generalized Power Rule
  - 7. Nondifferentiable Functions
- D. Further Applications of Derivatives
  - 1. Graphing Using the First Derivative
  - 2. Graphing Using the First and Second Derivatives
  - 3. Optimization
  - 4. Increments
  - 5. Tangent Lines
  - 6. Rates of Change
  - 7. Further Applications of Optimization in Business and Economics
  - 8. Optimizing Lot Size and Harvest Size
  - 9. Implicit Differentiation and Related Rates
- E. Exponential and Logarithmic Functions

1. Exponential Functions
2. Logarithmic Functions
3. Differentiation of Logarithmic and Exponential Functions
4. Two Applications to Economics: Relative Rates and Elasticity of Demand
- F. Integration and Its Applications
  1. Antiderivatives and Indefinite Integrals
  2. Approximating Definite Integrals as a Sum
  3. Integration Using Logarithmic and Exponential Functions
  4. Definite Integrals and Areas
  5. Further Applications of Definite Integrals: Average Value and Area Between Curves
  6. Applications to Business and Economics: Consumers' and Producers' Surplus, Continuous Money Flow
  7. Integration by Substitution
- G. Integration Techniques and Differential Equations
  1. Integration by Parts
- H. Calculus of Several Variables
  1. Functions of Several Variables
  2. Partial Derivatives
  3. Optimizing Functions of Several Variables
  4. Least Squares
  5. Lagrange Multipliers and Constrained Optimization

**METHODS OF INSTRUCTION:**

- A. Lecture:
- B. Online:
- C. Independent Study:
- D. Hybrid:

**INSTRUCTIONAL TECHNIQUES:**

**COURSE ASSIGNMENTS:**

**Reading Assignments**

Course textbook which provides explanations, worked examples, and problems to be solved.

**Writing Assignments**

Homework and assessments covering topics presented in the course.

**Out-of-class Assignments**

Homework and activities.

**METHODS OF STUDENT EVALUATION:**

Midterm Exam  
Final Exam  
Short Quizzes  
Written Assignments  
Essay Examinations  
Objective Examinations  
Report  
Projects (ind/group)  
Problem Solving Exercises  
Oral Presentations  
Skills Demonstration

**Demonstration of Critical Thinking:**

Students will demonstrate critical thinking and problem-solving skills by using logic, in conjunction with past mathematical solving techniques, to solve and interpret a variety of applications not previously seen through the evaluation of limits, derivatives, integrals, and various applications associated with each core topic. Demonstrations will be shown by completing assignments, participating in discussions, and completing required assessments.

**Required Writing, Problem Solving, Skills Demonstration:**

Students will demonstrate problem solving skills when they write their own solutions to homework and assessment problems.

**TEXTS, READINGS, AND RESOURCES:**

**TextBooks:**

1. Bittinger, Ellenbogen, and Surgent. *Calculus and its Applications, Brief Version*, 12th ed. Pearson, 2020
2. Calaway, Hoffman, and Lippman. *Business Calculus*, 1st ed. Open Textbook Store (OER) (classic), 2013

**LIBRARY:**

**Adequate library resources include:** Print Materials  
Non-Print Materials  
Online Materials

**Comments:**

**Attachments:**

[Attached Files](#)