MATH G140: BUSINESS CALCULUS

Item	Value
Curriculum Committee Approval Date	12/05/2023
Top Code	170100 - Mathematics, General
Units	4 Total Units
Hours	72 Total Hours (Lecture Hours 72)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• Area 2 Mathematics (GB2)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course 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. This course does not prepare a student to enter MATH G180 or MATH G185. Enrollment Limitation: MATH G140S; students who complete MATH G140 may not enroll in or receive credit for MATH G140S. PREREQUISITE: Course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitation: MATH G140 and MATH G180 combined: maximum credit, 1 course. C-ID: MATH 140. **C-ID:** MATH 140.

Course Level Student Learning Outcome(s)

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

Course Objectives

- 1. Compute limits of basic functions and the limit of their sums, differences, products, and quotients using the properties of limits.
- 2. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule.
- 3. Find the derivative of polynomial, rational, exponential, and logarithmic functions.
- 4. 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.
- 5. Analyze the marginal cost, revenue, and profit when given an appropriate function.
- 6. Determine the maxima and minima in optimization problems using derivatives.
- 7. Compute the first and second partial derivatives of functions of two variables.
- 8. Apply the calculus of functions of two variables to solve real world problems.
- 9. Use derivatives to find rates of change and tangent lines.
- 10. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques.
- 11. Use integration in business and economics applications.

Lecture Content

Functions Real Numbers, Inequalities, and Lines Exponents Functions Functions Continued Derivatives and Their Uses Limits and Continuity Rates of Change, Slopes, and Derivatives Sum and Difference Differentiation Rules The Product and Quotient Rules Higher-Order Derivatives The Chain Rule and the Generalized Power Rule Nondifferentiable Functions Further Applications of Derivatives Graphing Using the First Derivative Graphing Using the First and Second Derivatives Optimization Increments Tangent Lines Rates of Change Further Applications of Optimization in Business and Economics Optimizing Lot Size and Harvest Size Implicit Differentiation and Related Rates Exponential and Logarithmic Functions Exponential Functions Logarithmic Functions Differentiation of Logarithmic and Exponential Functions Two Applications to Economics: Relative Rates and Elasticity of Demand Integration and Its Applications Antiderivatives and Indefinite Integrals Approximating Definite Integrals as a Sum Integration Using Logarithmic and Exponential Functions Definite Integrals and Areas Further Applications of Definite Integrals: Average Value and Area Between Curves Applications to Business and Economics: Consumers' and Producers' Surplus, Continuous Money Flow Integration by Substitution Integration Techniques and Differential Equations Integration by Parts Calculus of Several Variables Functions of Several Variables Partial Derivatives Optimizing Functions of Several Variables Le ast Squares Lagrange Multipliers and Constrained Optimization

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

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.

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.

Eligible Disciplines

Mathematics: Master's degree in mathematics or applied mathematics OR bachelor's degree in either of the above AND master's degree in statistics, physics, or mathematics education OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Bittinger, Ellenbogen, and Surgent. Calculus and its Applications, Brief Version, 12th ed. Pearson, 2020 2. Required Calaway, Hoffman, and Lippman. Business Calculus, 1st ed. Open Textbook Store (OER) (classic), 2013 Rationale: The Business Calculus textbook by Open Textbook Store (http://www.opentextbookstore.com/buscalc/) is an O.E.R. source and the content is applicable for Business Calculus.