MATH A140: BUSINESS CALCULUS

Item	Value
Curriculum Committee Approval Date	05/18/2022
Top Code	170100 - Mathematics, General
Units	5 Total Units
Hours	90 Total Hours (Lecture Hours 90)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• OC Comm/Analytical Thinking - AA (OA2)
Associate Science Local General Education (GE)	• OCC Comm/AnalyticalThinking-AS (OAS2) • OCC Mathematics (OMTH)
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

Analytic geometry and limits; introduction to differential and integral calculus with applications to include polynomial, rational, exponential and logarithmic functions and their graphs. Multivariate calculus to include partial differentiation, multiple integration. Introduction to the calculus of probability with applications. PREREQUISITE: MATH A115, MATH A170, or appropriate placement. Transfer Credit: CSU; UC: Credit Limitation: MATH A140, MATH A180, MATH A180H and MATH A182H combined: maximum credit, 1 course.

Course Level Student Learning Outcome(s)

1. Explain concepts of differentiation and integration using analytical, graphical, and numerical methods.
2. Use rules and concepts of derivatives to solve applied problems.
3. Use concepts and methods of integration to solve applied problems.

Course Objectives

- 1. Manipulate polynomial, exponential and logarithmic functions.
- 2. Find standard types of limits for rational, exponential and logarithmic functions.
- 3. Find derivatives of polynomial, rational, exponential and logarithmic functions.
- 4. Use product, quotient and chain rule to find derivatives.
- 5. Use derivative rules to find maximums or minimums in applications.
- 6. Use calculus to analyze revenue, cost, and profit.
- 7. Use intercepts, limits and derivatives to sketch rational, exponential and logarithmic functions.
- 8. Find antiderivatives for rational, exponential and logarithmic functions using substitution and parts.
- 9. Use integrals in business and economics applications.
- 10. Maximize, minimize and find volumes in three dimensions.
- 11. Apply calculus in applications involving probability distributions.
- 12. Apply numerical techniques to find solutions to equations and area under a curve.

Lecture Content

Manipulate polynomial, exponential and logarithmic functions. Graph and evaluate exponential and logarithmic functions. Solve exponential equations. Find standard types of limits for rational, exponential and logarithmic functions. List the properties of limits and continuity. Determine points of discontinuity or intervals of continuity for functions. Evaluate limits (of all kinds) using Graphs Properties of limits Algebra Determine and graph asymptotes Horizontal Vertical Find derivatives of polynomial, rational, exponential and logarithmic functions. Compute average rate of change or the slope of a secant line. Compute instantaneous rate of change or the slope of a tangent line. Find an equation of the line tangent to a function at a point. Find the derivative of a function using the definition. Low degree polynomial Very simple fraction Very simple square root Use the definition of the derivative to prove basic differentiation formulae. Discuss instantaneous rate of change and acceleration in terms of the derivative. Determine points or intervals where functions are not differentiable. Determine the derivative functions of constants, power forms and sums. Use the product, quotient and chain rule to find derivatives of functions. Determine derivatives of products and quotients of functions. Determine derivatives of powers of functions using the general power rule. Determine derivatives combining rules. Find derivatives of logarithmic and exponential functions. State the general derivative rules Power Chain rule Logarithmic and exponential Find d erivatives of functions or relations by implicit differentiation. Use derivative rules to find maximums or minimums in applications. Determine higher order derivatives for explicitly defined functions. Use the differential of a function. Determine intervals over which functions are increasing or decreasing. Locate critical values of x. Find local extrema. State and use the first derivative test for local extrema. Describe concavity and inflection points. Determine intervals of concavity. Use the second derivative to determine Concavity Inflection points Local extrema Solve application problems Related rates Compound Interest Continuous compound interest Population growth Marginal analysis Use limits and derivatives to sketch rational, exponential and logarithmic functions. Demonstrate sound graphing strategy. Determine absolute maximum and minimum for functions. Find antiderivatives using properties of indefinite integrals and indefinite integral formulae. Algebraic functions Exponential and logarithmic functions Find definite and indefinite integrals by Direct Substitution Parts Evaluate definite integrals using The Fundamental Theorem Definite integral properties. Find area under a curve by evaluating a definite integral. Evaluate improper integrals by substitution or parts. Find area between curves by evaluating a definite integral. Proximate the value of definite integrals using summations and rectangles. Apply integrals in applications. Differential equations Economics Continuous c ompound interest

Exponential growth Population growth Apply calculus in applications involving probability distributions. Solve basic finite probability models. Verify and use probability density functions. From a given situation, find the expected value (mean) of X. the standard deviation of X. and evaluate probabilities using standard normal distributions. Maximize, minimize and find volumes in three dimensions. Evaluate functions of several variables for numerical and variable replacements. Find partial derivatives of first and second order. Find local extrema using the second partials test. Apply calculus of several variables to find Lagrange multipliers or least squares linear approximations. Evaluate double integrals over rectangular regions. Evaluate average value or volume under a surface.

Method(s) of Instruction

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

Instructional Techniques

Lecture, discussion, and written homework.

Reading Assignments

As assigned from textbook. 1 hour

Writing Assignments

Writing is encouraged throughout the course but is not necessarily a part of the grading or exams.1 hour

Out-of-class Assignments

Assigned problem-solving exercises. 6 hours

Demonstration of Critical Thinking

Several written exams and a comprehensive final.

Required Writing, Problem Solving, Skills Demonstration

Writing is encouraged throughout the course but is not necessarily a part of the grading or exams.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Bittinger, Marvin L, Ellenbogen, David J . Calculus and Its Applications, 12TH ed. Boston: Pearson Publishing, 2020

Other Resources

1. Other appropriate textbook as chosen by faculty.