LSU Dual Enrollment Program for Math

COURSE PROFILE

Content Revised 11-20-24

**COURSE NAME: Math 1431 Business Calculus (1 semester)**

**HIGH SCHOOL COURSE CODE: 160504**

**BOARD OF REGENTS COMMON COURSE NUMBER: CMAT 2103 Applied Calculus**

**PRIMARY ONLINE CONTENT SOURCE: *Calculus for Business, Economics, Life, and Social***

***Sciences, 14e Digital Update,* *MyLab Math,* Barnett, Ziegler, Byleen**

**COURSE/UNIT CREDIT: 3 credit hours, 1 Carnegie Unit**

**GRADE(S): 11 or 12**

**CHAPTERS**

**1 – Functions and Graphs**

**2 – Limits and the Derivative**

**3 – Additional Derivative Topics**

**4 – Graphing and Optimization**

**5 – Integration**

**6 – Additional Integration**

| **SECTION NAMES (NUMBER OF EXERCISES) AND LEARNING OBJECTIVES** |
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| **CHAPTER 1: Equations, Inequalities, and Applications** |
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| **1.1 Functions (17)**  Use points on a graph to identify input and output values  Evaluate functions  Find the domain of a function  Solve applications involving functions and their graphs |
| **1.3 Linear and Quadratic Functions (15)**  Graph linear equations  Work with slope, *y*-intercept, and the slope- intercept form of a line  Write the equation of a line given two points  Find the intercepts, vertex, range, and maximum or minimum value of a parabola from its graph  Use the vertex form of a quadratic function to find information about its graph |
| **1.5 Exponential Functions (13)**  Graph exponential functions  Describe transformations of the graphs of exponential functions  Graph exponential functions  Use properties of exponential functions to solve equations  Solve applications involving exponential functions |
| **1.6 Logarithmic Functions (20)**  Evaluate logarithms  Simplify logarithmic expressions  Solve logarithmic and exponential equations  Graph logarithmic functions  Solve applications involving logarithmic functions |
| **CHAPTER 2: Limits and the Derivative** |
| **2.1 Introduction to Limits (25)**  Use the graph of a function to estimate limits and function values  Use the properties of limits to find limits algebraically  Sketch the graph of a function using limits and function values  Find the limit of a difference quotient  Solve applications involving limits |
| **2.2 Infinite Limits and Limits at Infinity (27)**  Find infinite limits and limits at infinity using a graph  Find limits of rational functions  Find limits of functions at infinity  Describe the behavior of a rational function  Find horizontal and vertical asymptotes  Use the properties of limits to find limits algebraically  Solve applications involving limits and limits at infinity |
| **2.3 Continuity (17)**  Sketch the graph of a function using limits and function values  Estimate function values and limits using the graph of the function  Use the continuity properties of functions to determine where a function is continuous  Use continuity properties to solve inequalities  Solve applications involving continuity |
| **2.4 The Derivative (18)**  Find average and instantaneous rates of change  Use the four-step process to find the derivative of a function and evaluate the derivative  Use the graph of a function to determine whether the function is differentiable at a given x-value  Solve applications involving derivatives and rate of change |
| **2.5 Basic Differentiation Properties (30)**  Use basic differentiation properties to find the derivative of a function  Find equation of tangent lines and values of x for the line tangent to a function is horizontal  Solve applications involving derivatives |
| **2.7 Marginal Analysis in Business and Economics (15)**  Find marginal cost, revenue, and profit functions  Solve applications involving cost, revenue, and profit functions |

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| **CHAPTER 3: Additional Derivative Topics** |
| **3.1 The Constant e and Continuous Compound Interest (13)**  Evaluate and graph continuous compound interest functions  Solve equations and evaluate expressions with the constant *e*  Graph equations with continuous compounding  Solve applications involving e and continuous compound interest  Determine the future value of a lump sum of money  Solve applied problems involving compound interest  Determine the present value of a lump sum of money |
| **3.2 Derivatives of Exponential and Logarithmic Functions (15)**  Find derivatives involving exponential and logarithmic functions  Find equations of lines tangent to graphs at particular values  Solve applications involving derivatives of exponential and logarithmic terms |
| **3.3 Derivatives of Products and Quotients (30)**  Find derivatives of products  Find derivatives of quotients  Find the equation of a tangent line to the graph of a product or quotient function  Find the x-value at which the derivative of a function is zero  Solve applications involving derivatives of products and quotients |
| **3.4 The Chain Rule (34)**  Work with composite functions  Find derivatives of composition functions  Find tangent lines to the graph of a composition function  Solve applications involving derivatives that require the chain rule |
| **3.7 Elasticity of Demand (10)**  Find the elasticity of demand  Determine whether demand is elastic, inelastic, or has unit elasticity  Find values for which demand is elastic and inelastic  Solve applications involving the elasticity of demand |
| **CHAPTER 4: Graphing and Optimization** |
| **4.1 First Derivatives and Graphs (29)**  Find intervals on which functions are increasing and decreasing  Find local extrema  Use or create sign charts for graphs of functions  Find critical numbers of functions  Sketch graphs of functions  Solve applications involving the graph of a function’s first derivative |
| **4.2 Second Derivatives and Graphs (19)**  Identify particular intervals of graphs of functions  Find inflection points  Graph function given descriptions of the first and second derivative of the function  Find the derivative of functions  Find inflection points and determine concavity algebraically  Use curve sketching techniques  Solve applications involving the graph of a function’s second derivative |
| **4.5 Absolute Maxima and Minima (18)**  Find absolute extrema given the graph of a function  Find absolute extrema of a function |
| **4.6 Optimization (15)**  Optimize the product of two numbers  Solve area and perimeter optimization problems  Solve construction cost optimization problems  Solve geometric optimization problems  Solve maximizing revenue and profit problems  Solve inventory control optimization problems |
| **CHAPTER 5: Integration** |
| **5.1 Antiderivatives and Indefinite Integrals (24)**  Find indefinite integrals  Find particular antiderivatives  Solve applications involving antiderivatives and indefinite integrals |
| **5.2 Integration by Substitution (21)**  Reverse the chain rule to find indefinite integrals  Use the method of substitution to find antiderivatives and indefinite integrals  Find the family of all antiderivatives of a derivative  Solve applications involving antiderivatives that require substitution |
| **5.4 The Definite Integral (14)**  Identify rectangles under curves  Graph and identify areas by left and right sums  Calculate Riemann sums  Use properties of the definite integral |
| **5.5 Fundamental Theorem of Calculus (25)**  Compare changes in a function with the area under the graph of the function's derivative  Evaluate integrals using the Fundamental Theorem of Calculus  Find average values of functions over intervals  Solve applications involving definite integrals and the Fundamental Theorem of Calculus  Evaluate integrals using the Fundamental Theorem of Calculus  Solve applications involving definite integrals and the Fundamental Theorem of Calculus |
| **CHAPTER 6: Additional Integration** |
| **6.1 Area between Curves (20)**  Set up a definite integral to represent a shaded area  Find the area between two curves |
| **6.2 Applications (8)**  Solve continuous income stream problems  Find the future value of a continuous income stream  Solve consumers' and producers' surplus problems  Find equilibrium points, the consumer surplus, and the producer surplus |