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 valuesEvaluate functionsFind the domain of a functionSolve applications involving functions and their graphs |
| **1.3 Linear and Quadratic Functions (15)**Graph linear equationsWork with slope, *y*-intercept, and the slope- intercept form of a lineWrite the equation of a line given two pointsFind the intercepts, vertex, range, and maximum or minimum value of a parabola from its graphUse the vertex form of a quadratic function to find information about its graph |
| **1.5 Exponential Functions (13)**Graph exponential functionsDescribe transformations of the graphs of exponential functionsGraph exponential functionsUse properties of exponential functions to solve equationsSolve applications involving exponential functions |
| **1.6 Logarithmic Functions (20)**Evaluate logarithmsSimplify logarithmic expressionsSolve logarithmic and exponential equationsGraph logarithmic functionsSolve 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 valuesUse the properties of limits to find limits algebraicallySketch the graph of a function using limits and function valuesFind the limit of a difference quotientSolve applications involving limits |
| **2.2 Infinite Limits and Limits at Infinity (27)**Find infinite limits and limits at infinity using a graphFind limits of rational functionsFind limits of functions at infinityDescribe the behavior of a rational functionFind horizontal and vertical asymptotesUse 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 valuesEstimate function values and limits using the graph of the functionUse the continuity properties of functions to determine where a function is continuousUse continuity properties to solve inequalitiesSolve applications involving continuity |
| **2.4 The Derivative (18)**Find average and instantaneous rates of changeUse 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-valueSolve applications involving derivatives and rate of change |
| **2.5 Basic Differentiation Properties (30)**Use basic differentiation properties to find the derivative of a functionFind equation of tangent lines and values of x for the line tangent to a function is horizontalSolve applications involving derivatives  |
| **2.7 Marginal Analysis in Business and Economics (15)**Find marginal cost, revenue, and profit functionsSolve 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 functionsSolve equations and evaluate expressions with the constant *e*Graph equations with continuous compoundingSolve applications involving e and continuous compound interestDetermine the future value of a lump sum of moneySolve applied problems involving compound interestDetermine the present value of a lump sum of money |
| **3.2 Derivatives of Exponential and Logarithmic Functions (15)**Find derivatives involving exponential and logarithmic functionsFind equations of lines tangent to graphs at particular valuesSolve applications involving derivatives of exponential and logarithmic terms |
| **3.3 Derivatives of Products and Quotients (30)**Find derivatives of productsFind derivatives of quotientsFind the equation of a tangent line to the graph of a product or quotient functionFind the x-value at which the derivative of a function is zeroSolve applications involving derivatives of products and quotients |
| **3.4 The Chain Rule (34)**Work with composite functionsFind derivatives of composition functionsFind tangent lines to the graph of a composition functionSolve applications involving derivatives that require the chain rule |
| **3.7 Elasticity of Demand (10)**Find the elasticity of demandDetermine whether demand is elastic, inelastic, or has unit elasticityFind values for which demand is elastic and inelasticSolve 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 decreasingFind local extremaUse or create sign charts for graphs of functionsFind critical numbers of functionsSketch graphs of functionsSolve applications involving the graph of a function’s first derivative |
| **4.2 Second Derivatives and Graphs (19)**Identify particular intervals of graphs of functionsFind inflection pointsGraph function given descriptions of the first and second derivative of the function Find the derivative of functionsFind inflection points and determine concavity algebraicallyUse curve sketching techniquesSolve 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 functionFind absolute extrema of a function |
| **4.6 Optimization (15)**Optimize the product of two numbersSolve area and perimeter optimization problemsSolve construction cost optimization problemsSolve geometric optimization problemsSolve maximizing revenue and profit problemsSolve inventory control optimization problems |
| **CHAPTER 5: Integration** |
| **5.1 Antiderivatives and Indefinite Integrals (24)**Find indefinite integralsFind particular antiderivativesSolve applications involving antiderivatives and indefinite integrals |
| **5.2 Integration by Substitution (21)**Reverse the chain rule to find indefinite integralsUse the method of substitution to find antiderivatives and indefinite integralsFind the family of all antiderivatives of a derivative Solve applications involving antiderivatives that require substitution  |
| **5.4 The Definite Integral (14)**Identify rectangles under curvesGraph and identify areas by left and right sumsCalculate Riemann sumsUse 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 derivativeEvaluate integrals using the Fundamental Theorem of Calculus Find average values of functions over intervalsSolve applications involving definite integrals and the Fundamental Theorem of CalculusEvaluate integrals using the Fundamental Theorem of CalculusSolve 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 areaFind the area between two curves |
| **6.2 Applications (8)**Solve continuous income stream problemsFind the future value of a continuous income streamSolve consumers' and producers' surplus problemsFind equilibrium points, the consumer surplus, and the producer surplus |