LSU Dual Enrollment Program for Math

COURSE PROFILE

Content Revised July 2020

**COURSE NAME: LSU Math 1530 Differential Calculus**

**HIGH SCHOOL COURSE CODE: 160498**

**BOARD OF REGENTS COMMON COURSE NUMBER:**

**PRIMARY ONLINE CONTENT SOURCE: *Calculus: Early Transcendentals, 3e,* *MyMathLab*,**

**Briggs, Cochran, Gillett, Schultz**

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

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

**CHAPTERS**

**2 – Limits**

**3 – Derivatives**

**4 – Applications of the Derivative**

**SECTION NAMES (NUMBER OF EXERCISES) AND LEARNING OBJECTIVES**

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| **CHAPTER 2: Limits** |
| **2.1 The Idea of Limits (11)**  Apply concepts related to limits  Calculate average and instantaneous velocity  Calculate slopes of secant and tangent lines |
| **2.2 Definitions of Limits (20)**  Apply limit definitions  Find limits from a graph  Estimate limits from a table  Study limits for particular well-known functions |
| **2.3 Techniques for Computing Limits (32)**  Apply techniques for computing limits  Apply limit laws  Evaluate limits  Evaluate one-sided limits  Use the Sandwich Theorem |
| **2.4 Infinite Limits (23)**  Apply properties of infinite limits  Find infinite limits numerically or graphically  Evaluate limits analytically  Find vertical asymptotes |

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| **2.5 Limits at Infinity (27)**  Apply concepts relating to end behavior and horizontal asymptotes  Evaluate limits at infinity  Find horizontal asymptotes of rational functions  Determine end behavior and sketch graphs  Find horizontal and vertical asymptotes  Use limits to find steady states in applications  Find limits of sequences |
| **2.6 Continuity (32)**  Apply the concept of continuity  Find points of discontinuity or intervals of continuity  Determine whether a function is continuous at a point using the continuity checklist  Evaluate limits using principles of continuity  Use the Intermediate Value Theorem  Classify discontinuities |
| **CHAPTER 3: Derivatives** |
| **3.1 Introducing the Derivative (19)**  Review the concept of the derivative  Use limit definitions to find equations of tangent lines.  Understand differentiability and relate it to continuity  Understand derivatives graphically  Solve applications involving basic derivatives |
| **3.2 Working with Derivatives (16)**  Apply concepts related to working with derivatives  Work with the graph of the derivative of a function  Find derivatives of functions using limits  Determine continuity and differentiability and evaluate derivatives  Understand differentiability and relate it to continuity |
| **3.3 Rules of Differentiation (28)**  Use graphs and tables to find derivatives  Find derivatives using rules of differentiation  Simplify products and quotients and find their derivatives  Use derivatives to find slope locations and equations of tangent lines  Find higher-order derivatives of functions  Find limits related to derivatives |
| **3.4 The Product and Quotient Rules (25)**  Find derivatives of products and quotients of algebraic expressions  Find derivatives using two different methods  Find derivatives using the extended power rule  Find higher order derivatives of products and quotients  Find derivatives of products and quotients using given values or graphs  Find equations of tangent lines |
| **3.5 Derivatives of Trigonometric Functions (22)**  Find derivatives of basic trigonometric functions  Find limits involving trigonometric functions  Find derivatives of products, quotients, and powers of functions with trigonometric expressions.  Find higher order derivatives of functions involving trignometric expressions  Verify statements involving trignometric expressions  Find equations of tangent lines |
| **3.6 Derivatives as Rates of Change (14)**  Apply concepts related to derivatives as rates of change  Relate position, velocity, and acceleration to derivatives  Solve other applications involving derivatives as rates of change |
| **3.7 The Chain Rule (27)**  Apply properties of the chain rule  Find derivatives using the chain rule  Find equations of tangent lines |
| **3.8 Implicit Differentiation (21)**  Apply the concept of implicit differentiation  Find derivatives using implicit differentiation  Find equations of tangent lines using implicit differentiation  Find derivatives of functions with rational exponents  Find tangent and normal lines  Solve applications using implicit differentiation |
| **3.9 Derivatives of Logarithmic and Exponential Functions (31)**  Find derivatives involving logarithms and exponential  Find derivatives using logarithmic differentiation  Evaluate limits of logarithmic and exponential functions using the definition of the derivative |
| **3.10 Derivatives of Inverse Trig Functions (22)**  Apply concepts relating to the derivatives of inverse trigonometric functions  Find derivatives of functions involving inverse trigonometric functions  Find equations of tangent lines  Find derivatives of general inverse functions  Solve applications involving the rate of change of an angle with respect to a side |
| **3.11 Related Rates (20)**  Solve related rates problems involving geometry  Solve related rates applications for the rate of change of distance, area, or volume  Solve related rates applications for the rate of change of an angle |
| **CHAPTER 4: Applications of the Derivative** |
| **4.1 Maxima and Minima (28)**  Apply concepts related to maxima and minima  Use graphs to illustrate or identify extreme points  Find critical points and extreme points  Solve applications involving extreme points |
| **4.3a What Derivatives Tell Us (16)**  Find intervals on which a function is increasing and decreasing  Use the first derivative test to find local and absolute extrema |
| **4.3b What Derivatives Tell Us (16)**  Sketch functions from properties  Determine the concavity on intervals and find inflection points  Use the second derivative test to find local extrema  Compare *f*, *f '*, and *f ''* |
| **4.4 Graphing Functions (14)**  Sketch functions using analytic methods  Graph functions, and find any local extrema and inflection points  Sketch the general graph of functions given the equation of the derivatives |