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 limitsCalculate average and instantaneous velocityCalculate slopes of secant and tangent lines |
| **2.2 Definitions of Limits (20)**Apply limit definitionsFind limits from a graphEstimate limits from a tableStudy limits for particular well-known functions |
| **2.3 Techniques for Computing Limits (32)**Apply techniques for computing limitsApply limit lawsEvaluate limits Evaluate one-sided limitsUse the Sandwich Theorem |
| **2.4 Infinite Limits (23)**Apply properties of infinite limitsFind infinite limits numerically or graphicallyEvaluate limits analyticallyFind vertical asymptotes |

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| **2.5 Limits at Infinity (27)**Apply concepts relating to end behavior and horizontal asymptotesEvaluate limits at infinityFind horizontal asymptotes of rational functionsDetermine end behavior and sketch graphsFind horizontal and vertical asymptotesUse limits to find steady states in applicationsFind limits of sequences |
| **2.6 Continuity (32)**Apply the concept of continuityFind points of discontinuity or intervals of continuityDetermine whether a function is continuous at a point using the continuity checklistEvaluate limits using principles of continuityUse the Intermediate Value TheoremClassify discontinuities |
| **CHAPTER 3: Derivatives** |
| **3.1 Introducing the Derivative (19)**Review the concept of the derivativeUse limit definitions to find equations of tangent lines. Understand differentiability and relate it to continuityUnderstand derivatives graphicallySolve applications involving basic derivatives |
| **3.2 Working with Derivatives (16)**Apply concepts related to working with derivativesWork with the graph of the derivative of a functionFind derivatives of functions using limitsDetermine continuity and differentiability and evaluate derivativesUnderstand differentiability and relate it to continuity |
| **3.3 Rules of Differentiation (28)**Use graphs and tables to find derivativesFind derivatives using rules of differentiationSimplify products and quotients and find their derivativesUse derivatives to find slope locations and equations of tangent linesFind higher-order derivatives of functionsFind limits related to derivatives |
| **3.4 The Product and Quotient Rules (25)**Find derivatives of products and quotients of algebraic expressionsFind derivatives using two different methodsFind derivatives using the extended power ruleFind higher order derivatives of products and quotientsFind derivatives of products and quotients using given values or graphsFind equations of tangent lines |
| **3.5 Derivatives of Trigonometric Functions (22)**Find derivatives of basic trigonometric functionsFind limits involving trigonometric functionsFind derivatives of products, quotients, and powers of functions with trigonometric expressions.Find higher order derivatives of functions involving trignometric expressionsVerify statements involving trignometric expressionsFind equations of tangent lines  |
| **3.6 Derivatives as Rates of Change (14)**Apply concepts related to derivatives as rates of changeRelate position, velocity, and acceleration to derivativesSolve other applications involving derivatives as rates of change |
| **3.7 The Chain Rule (27)**Apply properties of the chain ruleFind derivatives using the chain ruleFind equations of tangent lines |
| **3.8 Implicit Differentiation (21)**Apply the concept of implicit differentiationFind derivatives using implicit differentiationFind equations of tangent lines using implicit differentiationFind derivatives of functions with rational exponentsFind tangent and normal linesSolve applications using implicit differentiation |
| **3.9 Derivatives of Logarithmic and Exponential Functions (31)**Find derivatives involving logarithms and exponentialFind derivatives using logarithmic differentiationEvaluate 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 functionsFind derivatives of functions involving inverse trigonometric functionsFind equations of tangent linesFind derivatives of general inverse functionsSolve applications involving the rate of change of an angle with respect to a side |
| **3.11 Related Rates (20)**Solve related rates problems involving geometrySolve related rates applications for the rate of change of distance, area, or volumeSolve 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 minimaUse graphs to illustrate or identify extreme pointsFind critical points and extreme pointsSolve applications involving extreme points |
| **4.3a What Derivatives Tell Us (16)**Find intervals on which a function is increasing and decreasingUse the first derivative test to find local and absolute extrema |
| **4.3b What Derivatives Tell Us (16)**Sketch functions from propertiesDetermine the concavity on intervals and find inflection pointsUse the second derivative test to find local extremaCompare *f*, *f '*, and *f ''* |
| **4.4 Graphing Functions (14)**Sketch functions using analytic methodsGraph functions, and find any local extrema and inflection pointsSketch the general graph of functions given the equation of the derivatives |