LSU Dual Enrollment Program for Math

 COURSE PROFILE

Content Revised July 2020

**COURSE NAME: LSU Math 1540 Integral Calculus**

**HIGH SCHOOL COURSE CODE: 160499**

**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**

**4 – Applications of the Derivative**

**5 – Integration**

**6 – Applications of Integration**

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

|  |
| --- |
| **CHAPTER 4: Applications of the Derivative** |
| **4.2 Mean Value Theorem (15)**Apply properties of Rolle's Theorem and the Mean Value TheoremFind points guaranteed to exist by Rolle's TheoremFind points guaranteed to exist by the Mean Value TheoremSolve applications using the Mean Value Theorem |
| **4.5 Optimization Problems (16)**Apply properties of optimization problems and objective functionsSolve optimization problems involving geometry, number operations, and conic sectionsSolve applications by optimizing functions |
| **4.6 Linear Approximations and Differentials (22)**Write a linear approximation and estimate the value of a functionGraph a function and its linear approximation to identify underestimates and overestimatesUse linear approximations to estimate a quantityUse linear approximations to estimate changes in a given variableWrite a differential expression the change in y as a function of the change in x |
| **4.7 L'Hopital's Rule (26)**Evaluate limits of the form 0/0Evaluate limits of the form infinity/infinity, 0\*infinity, or infinity-infinityEvaluate limits of the form 1^infinity, 0^0, or infinity^0Evaluate limits using the appropriate method |
| **4.8 Newton’s Method (11)**Given an initial approximation, use Newton’s method to find the first two approximationsUse Newton's method to find solutions to equations |

|  |
| --- |
| **4.9 Antiderivatives (38)**Find general antiderivatives and indefinite integralsFind particular antiderivatives and solve initial value problemsRelate solutions to initial value problems to their graphsSolve applications involving antiderivativesFind the equation of a curve given information about the derivativeSolve initial value problems |
| **CHAPTER 5: Integration** |
| **5.1 Approximating Areas under Curves (25)**Apply properties of Riemann sumsApproximate displacement over an interval given a velocity functionEvaluate left, right, and midpoint Riemann sumsEvaluate Riemann sums from tablesUse sigma notation and evaluate expressions in sigma notationSolve applications using the area under a curve |
| **5.2 Definite Integrals (21)**Apply properties of net area and definite integralsApproximate net area given functionsExpress Riemann sums as definite integralsEvaluate definite integrals using geometryApproximate net area from graphsUse properties of definite integralsEvaluate definite integrals using Riemann sums |
| **5.3 Fundamental Theorem of Calculus (26)**Apply properties of the Fundamental Theorem of CalculusEvaluate area functionsEvaluate definite integrals using the Fundamental Theorem of CalculusFind areas bounded by functionsEvaluate derivatives of definite integralsWork with area functions and graphs of area functions |
| **5.4 Working with Integrals (14)**Use symmetry to evaluate definite integralsFind average values of functions over given intervalsUse the Mean Value Theorem for IntegralsFind average values of functions |
| **5.5a Substitution Rule (22)**Verify formulas using differentiationApply properties of composite functions and the Substitution RuleFind indefinite integrals using a given substitutionUse a change of variables to find indefinite integralsUse a change of variables to evaluate definite integralsFind general antiderivatives and indefinite integralsFind areas of regions using integration that requires substitution |
| **5.5b Substitution Rule (19)**Review concepts related to antiderivativesUse a change of variables to find indefinite integralsUse a change of variables to evaluate definite integralsFind general antiderivatives and indefinite integralsEvaluate definite integrals using the Fundamental Theorem of CalculusFind particular antiderivatives and solve initial value problemsFind average values of functions over given intervals |
| **CHAPTER 6: Applications of Integration** |
| **6.1 Velocity and Net Change (19)**Apply properties of velocity and net changeDetermine displacement and position from velocityFind position and velocity from accelerationSolve applications involving net change and future value |
| **6.2 Regions Between Curves (15)**Apply concepts associated with the area between two curvesFind the area between two curvesRewrite areas by changing the variable of integration |
| **6.3 Volumes by Slicing (22)**Apply concepts associated with finding volumes by slicingUse the general slicing method to find volumes of solidsUse the disk method to find volumes of solidsUse the washer method to find volumes of solidsFind volumes of solids using an appropriate methodCompare volumes of solids |
| **6.4 Volume by Shells (15)**Use the shell method to find volumes of solids generated by revolving a region about the *y*-axisUse the shell method to find volumes of solids generated by revolving a region about the *x*-axisUse the shell method to find volumes of solidsFind volumes of solids using an appropriate method |
| **6.5 Length of Curves (9)**Find arc lengths by integrating with respect to *x*Solve applications involving arc length |
| **6.7 Density and Mass (12)**Apply concepts associated with mass, work, and forceFind the mass of thin bars with given density functionsSolve applications involving workSolve applications involving force |