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 Theorem  Find points guaranteed to exist by Rolle's Theorem  Find points guaranteed to exist by the Mean Value Theorem  Solve applications using the Mean Value Theorem |
| **4.5 Optimization Problems (16)**  Apply properties of optimization problems and objective functions  Solve optimization problems involving geometry, number operations, and conic sections  Solve applications by optimizing functions |
| **4.6 Linear Approximations and Differentials (22)**  Write a linear approximation and estimate the value of a function  Graph a function and its linear approximation to identify underestimates and overestimates  Use linear approximations to estimate a quantity  Use linear approximations to estimate changes in a given variable  Write 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 0/0  Evaluate limits of the form infinity/infinity, 0\*infinity, or infinity-infinity  Evaluate limits of the form 1^infinity, 0^0, or infinity^0  Evaluate limits using the appropriate method |
| **4.8 Newton’s Method (11)**  Given an initial approximation, use Newton’s method to find the first two approximations  Use Newton's method to find solutions to equations |

|  |
| --- |
| **4.9 Antiderivatives (38)**  Find general antiderivatives and indefinite integrals  Find particular antiderivatives and solve initial value problems  Relate solutions to initial value problems to their graphs  Solve applications involving antiderivatives  Find the equation of a curve given information about the derivative  Solve initial value problems |
| **CHAPTER 5: Integration** |
| **5.1 Approximating Areas under Curves (25)**  Apply properties of Riemann sums  Approximate displacement over an interval given a velocity function  Evaluate left, right, and midpoint Riemann sums  Evaluate Riemann sums from tables  Use sigma notation and evaluate expressions in sigma notation  Solve applications using the area under a curve |
| **5.2 Definite Integrals (21)**  Apply properties of net area and definite integrals  Approximate net area given functions  Express Riemann sums as definite integrals  Evaluate definite integrals using geometry  Approximate net area from graphs  Use properties of definite integrals  Evaluate definite integrals using Riemann sums |
| **5.3 Fundamental Theorem of Calculus (26)**  Apply properties of the Fundamental Theorem of Calculus  Evaluate area functions  Evaluate definite integrals using the Fundamental Theorem of Calculus  Find areas bounded by functions  Evaluate derivatives of definite integrals  Work with area functions and graphs of area functions |
| **5.4 Working with Integrals (14)**  Use symmetry to evaluate definite integrals  Find average values of functions over given intervals  Use the Mean Value Theorem for Integrals  Find average values of functions |
| **5.5a Substitution Rule (22)**  Verify formulas using differentiation  Apply properties of composite functions and the Substitution Rule  Find indefinite integrals using a given substitution  Use a change of variables to find indefinite integrals  Use a change of variables to evaluate definite integrals  Find general antiderivatives and indefinite integrals  Find areas of regions using integration that requires substitution |
| **5.5b Substitution Rule (19)**  Review concepts related to antiderivatives  Use a change of variables to find indefinite integrals  Use a change of variables to evaluate definite integrals  Find general antiderivatives and indefinite integrals  Evaluate definite integrals using the Fundamental Theorem of Calculus  Find particular antiderivatives and solve initial value problems  Find 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 change  Determine displacement and position from velocity  Find position and velocity from acceleration  Solve applications involving net change and future value |
| **6.2 Regions Between Curves (15)**  Apply concepts associated with the area between two curves  Find the area between two curves  Rewrite areas by changing the variable of integration |
| **6.3 Volumes by Slicing (22)**  Apply concepts associated with finding volumes by slicing  Use the general slicing method to find volumes of solids  Use the disk method to find volumes of solids  Use the washer method to find volumes of solids  Find volumes of solids using an appropriate method  Compare 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*-axis  Use the shell method to find volumes of solids generated by revolving a region about the *x*-axis  Use the shell method to find volumes of solids  Find 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 force  Find the mass of thin bars with given density functions  Solve applications involving work  Solve applications involving force |