

Mathematics 104—Calculus, Part I (4h, 1 CU)

Course Description: Brief review of High School Calculus, methods and applications of integration, infinite series, Taylor's theorem, first order ordinary differential equations. Use of symbolic manipulation and graphics software in Calculus. Note: This course uses Maple®. Fulfills the FORMAL REASONING & ANALYSIS General Requirement.

Texts: Stewart, *Calculus, 6th Edition*
Maple/Calculus Lab Manual for Math 103/104/114/115

Chapter and Section	Core Problems
Review of Basics—selected topics from Ch. 2-5	limits, derivatives, basic integration through u-substitution; See Math 103 core problem lists
6. Applications of Integration	
6.1 More About Areas	2, 7, 23, 29, 34, 41, 45
6.2 Volume	3, 21, 34, 46, 49, 68
6.3 Volumes by Cylindrical Shells	2, 5, 15, 26, 33, 38, 43
6.5 Average Value of a Function	1, 7, 10, 15, 16, 22
8. Techniques Of Integration	
8.1 Integration by Parts	1, 15, 20, 23, 34, 46, 55, 62
8.2 Trigonometric Integrals	3, 8, 13, 31, 52, 55, 57, 62
8.3 Trigonometric Substitution	1, 12, 22, 32, 36, 40
8.4 Integration of Rational Functions by Partial Fractions	2, 7, 23, 35, 44, 51, 54, 55, 62
8.5 Strategy for Integration	2, 9, 25, 30, 41, 48, 52
8.6 <i>Integration Using Tables and Computer Algebra Systems</i>	<i>To be covered as part of general discussion of methods of integration; 1, 7, 14, 31, 37</i>
8.7 Approximate Integration	1, 2, 10, 19, 26, 29, 32, 37
8.8 Improper Integrals	2, 4, 6, 21, 35, 47, 50, 57, 67
9. Further Applications Of Integration	
9.1 Arc Length	3, 8, 13, 17, 19, 22, 26, 31, 34, 39
9.2 Area of a Surface of Revolution	1, 6, 15, 17, 28
9.3 Applications to Physics and Engineering	1, 4, 13, 18, 19, 21, 26, 31, 35, 41
9.4 Applications to Economics and Biology	1, 4, 7, 9, 14, 18
9.5 Probability	2, 5, 8, 10, 13
12. Infinite Sequences And Series	
12.1 Sequences	1, 3, 8, 9, 13, 19, 23, 28, 36, 41, 50, 55, 59, 62
12.2 Series	1, 4, 7, 8, 11, 14, 23, 29, 35, 38, 42, 77, 58, 64
12.3 The Integral Test and Estimates of Sums	1, 5, 9, 11, 19, 21, 28
12.4 The Comparison Tests	1, 2, 4, 9, 18, 22, 28, 34, 37, 40, 45
12.5 Alternating Series	1, 5, 11, 17, 19, 21, 24, 29, 32, 35
12.6 Absolute Convergence and the Ratio and Root Tests	1, 2, 7, 11, 14, 17, 25, 29, 38
12.7 Strategy for Testing Series	1, 7, 9, 14, 20, 25, 26, 35
12.8 Power Series	1, 2, 3, 9, 13, 21, 24, 27, 29, 31, 33, 37
12.9 Representations of Functions as Power Series	1, 2, 5, 9, 11, 13, 16, 20, 28, 35
12.10 Taylor and Maclaurin Series	1, 2, 3, 4, 9, 13, 17, 27, 25, 30, 34, 39, 49, 56, 60
12.11 Applications of Taylor Polynomials	2, 5, 23, 28

10. Differential Equations

10.1 Modeling with Differential Equations	2, 3, 6, 7, 9, 11, 14
10.2 Direction Fields and Euler's Method	2, 3, 4, 5, 6, 11, 18, 23, 28
10.3 Separable Equations	3, 9, 12, 16, 21, 23, 27, 30, 35, 38, 41
10.4 Models for Population Growth	1, 3, 4, 5, 7, 12, 15, 19

NOTES:

- **All sections of Math 104 will have a common final examination.**
- Midterm examinations *may* be given outside regular class times at the professor's option.
- Problems from the sample Final Examinations (which may be found at the end of the Maple Lab Manual and on the Mathematics Department's web site) also form part of the core problem set.