Math 104

Calculus, Part I. (4h. 1 c.u.)
Brief review of High School Calculus, applications of integrals, transcendental functions, methods of integration, infinite series, Taylor's theorem, multivariable functions, partial derivatives. Use of symbolic manipulations and graphics software in Calculus.
Note: This course uses Maple

Texts: Thomas/Finney, Calculus, 9th (or Alternate) Edition—Special Penn Edition
Maple/Calculus Lab Manual for Math 104/114/115

Syllabus:

Chapter	Section & Topic	Core Problems
5. Application of Integrals		
5.1	*Areas Between Curves*	9, 19, 26, 31, 52
5.2	*Finding Volumes By Slicing*	5, 10, 12
5.3	*Volumes of Solids of Revolution*	6, 23, 38, 41, 45
5.4	*Cylindrical Shells*	1, 4, 15, 26, 37
5.5	*Lengths of Plane Curves*	10, 11
5.6	*Areas of Surfaces of Revolution*	11, 15, 29
5.7	*Moments and Centers of Mass*	7, 26, 29, 31
6. Transcendental Functions		
6.1	*Inverse Functions and Derivatives*	13, 15, 24, 31, 34
6.2	*Natural Logarithms*	1, 2, 3, 7, 18, 35, 47, 49, 51, 57, 82
6.3	*The Exponential Function*	1-10, 13, 14, 15, 20, 37, 48, 63, 77
6.4	a^x *and* $\log_a x$	1-10, 16, 27, 39, 40, 51, 85
6.5	*Growth and Decay*	1, 5, 8, 10, 11, 12, 21, 27
6.6	*L'Hospital's Rule*	5, 18, 29, 33, 35, 43, 60, 65
6.7	*Relative Rates of Growth*	1, 2, 5, 7, 8
6.8	*Inverse Trigonometric Functions*	1-6, 13, 14, 17, 19, 29, 31, 33, 41, 42, 43, 44
6.9	*Derivatives of Inverse Trigonometric Functions; Integrals*	3, 7, 20, 36, 51, 58
6.10	*Hyperbolic Functions* (optional)	
6.11	*First Order Differential Equations*	3, 10, 13, 15, 16, 19, 21, 23, 35, 36, 40, 46, 55
6.12	*Euler's Numerical Method; Slope Fields*	3, 18
7. Methods of Integration		
7.1	*Basic Integration Formulas*	9, 32, 40, 51, 62, 66, 83
7.2	*Integration by Parts*	3, 11, 14, 25, 41, 43
7.3	*Partial Fractions*	11, 18, 27, 36, 43, 48
7.4	*Trigonometric Substitutions*	3, 8, 15, 24, 35, 40
7.6	*Improper Integrals*	8, 21, 39, 44, 71, 75

8. Infinite Series

8.1	*Limits of Sequences of Numbers*	6, 15, 35, 36, 55
8.2	*Theorems for Calculating Limits of Sequences*	1, 3, 15, 20, 33, 77
8.3	*Infinite Series*	7, 8, 9, 10, 17, 23, 24, 26, 39, 75
8.4	*The Integral Test for Series of Nonnegative Terms*	7, 9, 10, 28, 42
8.5	*Comparison Tests for Series of Nonnegative Terms*	2, 8, 9, 16, 23
8.6	*The Ratio and Root Tests for Series of Nonnegative Terms*	4, 5, 6, 17, 28, 41, 45
8.7	*Alternating Series, Absolute and Conditional Convergence*	3, 8, 13, 26, 34
8.8	*Power Series*	5, 9, 12, 17, 34, 42
8.9	*Taylor and Maclaurin Series*	3, 13, 26, 34
8.10	*Convergence of Taylor Series; Error Estimates*	7, 21, 23, 42, 44
8.11	*Applications of Power Series*	4, 12, 44

12. Multivariable Functions

12.1	*Functions of Several Variables*	5, 8, 13-19, 25, 45
12.2	*Limits and Continuity*	11, 16
12.3	*Partial Derivatives*	5, 19, 30, 47

OLD EXAM QUESTIONS also form a part of the core.

The core problems indicate the kind of basic problems you will need to be able to solve by hand. They also provide a guide to the basic level of difficulty to be expected on the final exam.

Note: All sections of Math 104 have a COMMON FINAL EXAM