COURSE #: 20500 **COURSE TITLE: Elements of Calculus** CATEGORY: Introductory, part of sequence Math 205, Math 209 TERM OFFERED: Every Term PRE-REQUISITES: Grade C or higher in Math 19500 pre-calculus; or placement by the department. Credit will be given for only one of Math20100 or Math20500. HOURS/CREDITS: 4 hrs/wk; 4 credits DATE EFFECTIVE: 01/01/13 COURSE Supervisor: **Gautam Chinta**	**CATALOG DESCRIPTION** Limits, derivatives, rules of differentiation, graph sketching, maximum and minimum problems, related rates, exponential and logarithmic functions, differential equations, anti-derivatives, area, volume **Text:** Brief Applied Calculus, Stewart and Clegg,

Topics and Allotted Times

Suggested Periods	Section	Topics	Suggested Problems
0.5	1.1	Review of functions, including piecewise defined functions.	1-5, 8, 21, 23,25, 28, 30, 31-34,37-49
0.5	1.2	Combining and composition of functions (omit transformations).	1, 7, 10, 12, 14, 15,17, 19, 26-32
1	1.3	Lines and linear models (include word problem in page 33).	1, 3, 5, 8, 9,13,15,17,20, 21, 26,37, 43
1	1.5	Exponential Functions	1,15-23,27,30, 35, 37,38,39
1	1.6	Logarithmic functions (do base in page 75)	1-6, 11,12, 23-30, 33-42, 47
2	2.1, 2.2	Rate of change	**2.1:** 1-4,9,11,17,21; 2 **2:2**: 1,5,19,21,31,34,35,44,47,49,50,51
2	2.3	Limit definition of the derivative. Tangent Lines. Do page 106.	1-4,6,9,15,19,21,23,26,29,33,35,39,45,56
1	2.4	Page: 119-123 Leibniz notation and higher derivatives.	1,3,4,14,17,20-30,33,38,39,
2	3.1	Initial derivative formulas, including e^x	1,5,9,10,20,22,23,26,28-38,39,41,57,58,63
1	3.2	Linear approximation and marginal cost.	1,3,4,5,7,9,11,13,14,19,21,23,24
2	3.3	Product and quotient rules. &1,3,6.	1-21, 24,25,35,38,39,41,42
2	3.4	The Chain Rule.	1,4,5,9,14,17,20,23,26,29,32,35,41,42,47,53,63
2	3.5	Implicit and logarithmic differentiation also derivative of ln x.	1-11,15,17,21,25,26,29,31,34,35,39-41,52,60*
2	3.6	Exponential growth and decay.	1,3,5,7,11,16,17,20,23,24
2	4.1	Related Rate.	1-9,13,17,20,24
2	4.2	Maxima and minima. Include the closed interval case	1-6,7,10,11,15,18,22,25,31,33,34,37,41,42,45
1	4.3	Derivatives and shape of curves.	1-3,5,7,9,10,11,13,14,16,18,21,24,31,32,37,38
1	4.4	Asymptotes.	1-4,5,7,11-28,30,32,36*,38*
2	4.5	Summary of Curve Sketching.	1,4,8,9,10,12,21,23,25,27
2	4.6, 47	More optimization Problems.	**4.6:** 1,2,5,6,7,8,9,10,12,13,14 **4.7:** 1,3,4,5,6,7,9,11,17,19
2	5.1, 5.2	Integral, antiderivatives and fundamental theorem of calculus.	**5.1:** 3,7,9,10,13,15,17-25,36* **5.2:** 1,3,11,13,15,17,20,24,26,28,31,32,34,42,64,69
3	5.4	The Substitution rule of integration.	1-6,8,11,13,15,17,19,20,22,25,29,35,40,44
2	6.1	Areas Between Curves.	1-4,5,7,9,12,16,19,33
2	6.2	Other application of integration.	1-8,9,11,15-18,19,23,24
	6.4	Differential equations.	
39	Total		

COURSE LEARNING OUTCOMES

After taking this course, the student should be able to:	Contributes to Departmental Learning Outcome(s):
1. Use limits to calculate derivatives.	a, b, e1, e2
2. Differentiate algebraic, logarithmic and exponential functions	a, b, e1, e2
3. Solve related rates problems	a, b, c
4. Apply methods of calculus to sketch curves.	a, b
5. Solve maximum and minimum problems,	a, b, c, e1, e2
6. Use exponential functions to model growth and decay.	a, c
7. Anti-differentiate polynomial, logarithmic and exponential functions.	a, b, c, e1, e2
8. Use calculus to find areas.	a, b

COURSE ASSESSMENT TOOLS

1. Term average, based mostly on in-class examinations: 60% of grade
2. Comprehensive written final exam: 40% of grade.

DEPARTMENTAL LEARNING OUTCOMES

The mathematics department, in its varied courses, aims to teach students to

a. perform numeric and symbolic computations
b. construct and apply symbolic and graphical representations of functions
c. model real-life problems mathematically
d. use technology appropriately to analyze mathematical problems
e. state (e1) and apply (e2) mathematical definitions and theorems
f. prove fundamental theorems
g. construct and present (generally in writing, but, occasionally, orally) a rigorous mathematical argument