
LAKELAND COMMUNITY COLLEGE - COURSE OUTLINE FORM

ORIGINATION DATE:	08/02/99	APPROVAL DATE:	02/22/07
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COURSE ID: MATH2350

COURSE TITLE: Applied Calculus I

	LECTURE	LAB	CLINICAL	TOTAL	OBR MIN	OBR MAX
CREDITS:	3.00	0.00	0.00	3.00	3.00	3.00
CONTACT HOURS:	3.00	0.00	0.00	3.00		

PREREQUISITE:

MATH1650 OR PERMISSION OF INSTRUCTOR

COURSE DESCRIPTION:

This course explores differential calculus as applied to business, social sciences, and life sciences. Topics include functions, limits, and derivatives of algebraic, exponential, and logarithmic functions; applications of derivatives to maximum and minimum values of a function; cost, revenue, profit, supply, and demand; growth rates; decay rates; and logistics curves. Students must supply a graphing calculator.

RATIONALE FOR COURSE:

The differential calculus and its concepts are an important tool for applications in business, social, and biological sciences. This course is required in most baccalaureate business, accounting, economics, and finance programs.

GENERAL COURSE GOALS:

The course will

1. Further develop students' ability to use the language of mathematics correctly in speaking and writing.
 2. Introduce, develop, and apply differential calculus techniques and demonstrate their utility towards solving real-life problems.
 3. Further develop the use of technology (graphing calculator and computer) as a tool for determining solutions to real-life dynamic problems.
 4. Further develop students' abilities to solve real-life problems utilizing the derivative and analyze and solve these problems analytically and graphically.
 5. Engage students in the exploration of the central ideas of calculus through laboratory experiments, individually, and/or in groups.
 6. Further strengthen students' ability to critically apply mathematical thinking to develop and test hypotheses, solve problems, and determine reasonableness of results.
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COURSE OBJECTIVES:

Upon completion of the course, the student should be able to

1. Apply the average rate of change concept to real-world problems.
2. Apply the instantaneous rate of change concept to real-world problems.
3. Determine the limit of a function.
4. Compute the derivative of a function via the definition of a derivative.
5. Apply differentiation theorems to determine derivatives of algebraic functions.
6. Compute derivatives using the Generalized Power Rule.
7. Compute derivatives using implicit differentiation.
8. Utilize differentials and related rates in applications.
9. Use properties of derivatives to determine relative and absolute extrema of functions.
10. Use the first and second derivative tests.
11. Apply derivatives to compute minimum costs, maximum profits, maximum revenue, marginal analysis, velocity and acceleration, growth, and decay rates.
12. Apply properties of exponential and logarithmic functions.
13. Compute the derivative of exponential and logarithmic functions.
14. Utilize the second derivative test to find the point of maximum increase on a logistics curve.
15. Approximate roots of a function using Newton's Method algorithm.
16. Develop analytic as well as graphic and numeric techniques using technology for solving problems.
17. Apply appropriate technology to develop and test hypotheses, solve mathematical problems, and judge the reasonableness of the results.

COURSE OUTLINE:

- I. Pre-calculus Review
 - A. Functions and Graphs
 1. Function notation
 2. Domain and range
 - a. Interval Notation
 - b. Exponents and Radicals
- II. The Limit Concept
 - A. Definition of limit
 - B. Computing limits of functions by the rule-of-three
 1. Properties of limits
 2. Finding limits
 - a. Limits of rational functions
 - b. Limits of polynomials
 - c. Limits of exponential functions
 - d. Limits of logarithmic functions
 - e. Limits of radical functions
 - f. Limits of power functions
 - g. Limits of rational exponent functions

- h. Limits of logistic curves
- C. Continuity

III. The Derivative

- A. Average and instantaneous rates of change
- B. Definition of derivative
 - 1. Computation via definition
 - 2. Properties of the derivative
- C. Differentiation Techniques
 - 1. Fundamental Differentiation Theorems
 - 2. Product and Quotient Rules
 - 3. Chain Rule (Generalized Power Rule)
 - 4. Implicit Differentiation
 - 5. Higher order derivatives

IV. Curve Sketching

- A. Increasing and decreasing functions
 - 1. The first derivative test
 - 2. Relative extrema
- B. Concavity
 - 1. The second derivative test
 - 2. Points of inflection

V. Applications of the Derivative

- A. Optimization
- B. Marginal Analysis
 - 1. Maximum profit
 - 2. Maximum revenue
 - 3. Minimum cost
 - 4. Elasticity of demand
- C. Related rates
- D. Differentials
- E. Newton's Method

VI. Exponential and Logarithmic Functions

- A. The graphs and properties of exponential and logarithmic functions
- B. The derivatives of exponentials and logarithmic functions
- C. Applications
 - 1. Exponential growth and decay
 - a. Logistics curve
 - 2. Applications of finance
 - a. Compound interest
 - b. Continuous compound interest

INSTRUCTIONAL PROCEDURES THAT MAY BE UTILIZED:

Lecture/discussion

Computer/graphing calculator based activities

Group and/or individual activities

Research projects utilizing real data gathered from the Internet or other sources

GRADING PROCEDURES:

It is recommended that instructors have at least five evaluative items on which to determine student's final grade. In general, tests are given covering the lecture and homework assignments.

COURSE EVALUATION PROCEDURES:

Student course evaluations

Student success rate in subsequent Math courses

LAKELAND LEARNING OUTCOMES

		Methods of Assessment								
		1	2	3	4	5	6	7	8	9
LEARNS ACTIVELY										
1.	Takes responsibility for his/her own learning									
2.	Uses effective learning strategies									
3.	Reflects on effectiveness of his/her own learning strategies									
THINKS CRITICALLY		1	2	3	4	5	6	7	8	9
4.	Identifies an issue or idea									
5.	Explores perspectives relevant to an issue or idea									
6a.	Identifies options or positions									
6b.	Critiques options or positions									
7.	Selects an option or position	1	2							
8a.	Implements a selected option or position									
8b.	Reflects on a selected option or position									
COMMUNICATES CLEARLY		1	2	3	4	5	6	7	8	9
9a.	Uses correct spoken English									
9b.	Uses correct written English									
10.	Conveys a clear purpose									
11.	Presents ideas logically									
12a.	Comprehends the appropriate form(s) of expression									
12b.	Uses the appropriate form(s) of expression									
13.	Engages in an exchange of ideas									
USES INFORMATION EFFECTIVELY		1	2	3	4	5	6	7	8	9
14.	Develops an effective search strategy									
15a.	Uses technology to access information	1	2							
15b.	Uses technology to manage information	1	2							
16.	Uses selection criteria to choose appropriate information									
17.	Uses information responsibly									
INTERACTS IN DIVERSE ENVIRONMENTS		1	2	3	4	5	6	7	8	9
18a.	Demonstrates knowledge of diverse ideas									
18b.	Demonstrates knowledge of diverse values									
19.	Describes ways in which issues are embedded in relevant contexts									
20a.	Collaborates with others									
20b.	Collaborates with others in a variety of situations									
21.	Acts with respect for others									

Methods of Assessment Codes:		
1. Test/Examination	4. Collaborative Writing	7. Portfolio
2. Homework/Written Assignment	5. Presentation	8. Demonstration of Skills
3. Research Project	6. Lab Project	9. Other (Specify in Grading Procedures)