

BUTTE COLLEGE

COURSE OUTLINE

I. CATALOG DESCRIPTION

MATH 13 - Survey of Calculus

4 Unit(s)

Prerequisite(s): MATH 124 or Math Level V

Recommended Prep: Two years high-school algebra and Reading Level IV

Transfer Status: CSU/UC

68 hours Lecture

Presents a study of the techniques of calculus with emphasis placed on the application of these concepts to business and management related problems. The applications of derivatives and integrals of functions including polynomials, rational, exponential and logarithmic functions are studied. This course is offered only once each academic year. (C-ID MATH 140).

II. OBJECTIVES

Upon successful completion of this course, the student will be able to:

- A. Find the derivatives of polynomial, rational, exponential, and logarithmic functions.
- B. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule.
- C. Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing and decreasing, maximum and minimum values, intervals of concavity and points of inflection.
- D. Analyze the marginal cost, profit and revenue when given the appropriate function.
- E. Determine maxima and minima in optimization problems using the derivative.
- F. Use derivatives to find rates of change and tangent lines.
- G. Use calculus to analyze revenue, cost, and profit.
- H. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques.
- I. Use integration in business and economics applications.

III. COURSE CONTENT

A. Unit Titles/Suggested Time Schedule

Lecture	
<u>Topics</u>	<u>Hours</u>
1. Functions and their graphs, including exponential and logarithmic functions	14.00
2. Limits and intuitive limit definition of derivative	5.00
3. Increments, tangent lines, and rate of change	4.00
4. Rules of differentiation including sum, product, quotient, and the chain rule	12.00
5. Implicit differentiation	2.00
6. Applications of differentiation such as marginal analysis, optimization, and curve sketching	12.00
7. Antiderivatives, indefinite and definite integrals	5.00
8. Multiple techniques of integration including substitution	5.00
9. Area between curves	3.00
10. Approximating definite integral as a sum	2.00
11. Applications of integration in business and economics	4.00

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Collaborative Group Work
- C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- D. Discussion
- E. Board Work

V. METHODS OF EVALUATION

- A. Exams/Tests
- B. Quizzes
- C. Daily Homework Assignments, where the student will demonstrate problem-solving skills
- D. Class Assignments and Class Response

VI. EXAMPLES OF ASSIGNMENTS

- A. Reading Assignments
 - 1. Read the section in the textbook on limits and be able to find the limit of a function graphically and algebraically by using properties of limits and analytic techniques.
 - 2. Read the section in the textbook on antidifferentiation and be able to find the antiderivative of a function, evaluate indefinite integrals using basic rules of antidifferentiation and use initial conditions to determine an antiderivative.
- B. Writing Assignments
 - 1. Describe in words how to find the limit as x approaches 2 for the function $3x - 4$. Assume you are teaching it to someone for the first time and write a detailed explanation.
 - 2. Describe in words the process you would go through to evaluate the indefinite integral of $x^6 dx$. Assume you are explaining it to someone in the class who is having trouble and write a detailed explanation.
- C. Out-of-Class Assignments
 - 1. Review the section in the textbook on limits and do the problems assigned by the instructor, show each step.
 - 2. Review the section in the textbook on antidifferentiation and do the problems assigned by the instructor, showing each step.

VII. RECOMMENDED MATERIALS OF INSTRUCTION**Textbooks:**

- A. Bittinger, M.L., Ellenbogen, D.J. & Surgent, S.A. Calculus and Its Applications. 10th Edition. Addison-Wesley Pearson, 2012.

Materials Other Than Textbooks:

- A. Scientific calculator or graphing calculator without symbolic algebra capabilities

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