

# MATH 26A : CALCULUS I FOR THE SOCIAL AND LIFE SCIENCES

California State University, Sacramento • Department of Mathematics & Statistics

This is the first course of a one year calculus sequence designed for students with majors in the social or life sciences and construction management. It also meets the requirements of some options in the computer science majors. The treatment in this course is less rigorous than in Math 30, 31, and 32. This sequence may meet the requirements of some medical and dental schools, but students should verify this with the particular medical or dental school in question. Students who have not had a mathematics course within the past two years may need to use the Mathematics Laboratory or the Learning Skills Center for review. Many students who have completed the prerequisites have also found Math 29 to be valuable preparation for this one year sequence. Students will be given periodic writing assignments to encourage them to think through the concepts of the course.

## CATALOG DESCRIPTION

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Limits, differentiation with applications, integration and applications in the Social and Life Sciences. **Graded:** Graded Student. **Units:** 3.0.

## PREREQUISITES

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Math 11 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of the ELM requirement and a passing score on the Intermediate Algebra Diagnostic (IAD) test.

## LEARNING OBJECTIVES

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- Understand the definition of the derivative and interpret the definition geometrically and in a variety of applied contexts including instantaneous velocity.
- Know the fundamental rules of differentiation including the chain rule and use these rules to compute the derivatives of polynomials, rational functions, exponential, and logarithmic functions.
- Use the limits and the derivative to identify asymptotes, relative extrema, and inflection points of curves and apply these techniques to curve sketching.
- Know the Extreme Value Theorem and use this result to solve optimization problems.
- Understand the indefinite integral as the inverse of differentiation, know the basic rules of integration, and use these rules to evaluate elementary antiderivatives.

## TEXT

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*Applied Calculus for the Life and Social Sciences*, by Ron Larson

## COVERAGE

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Chapters 1-4, and 6.

## WRITING COMPONENT

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This is an area B4 GE course and has a writing component. To satisfy the writing requirement graded assignments involving writing and understanding of complex technical prose, interpretation of theoretical ideas, and the use of mathematical ideas will be part of the course.

## AREA B-4 MATHEMATICAL CONCEPTS AND QUANTITATIVE REASONING STUDENT LEARNING OUTCOMES

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Students will be able to:

1. Solve problems by thinking logically, making conjectures, and constructing valid mathematical arguments.
2. Make valid inferences from numerical, graphical and symbolic information.
3. Apply mathematical reasoning to both abstract and applied problems, and to both scientific and non-scientific problems.

### ASSIGNMENTS

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A variety of reading and problem solving assignments will be part of the course.

### EXAMINATIONS

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There will be regular midterm examinations and a comprehensive final examination for this course.

### COURSE OUTLINE

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- I. Algebra Review (1 week)
  - A. Simplifying expressions, exponents and radicals
  - B. Factoring
  - C. Algebraic fractions
  - D. Solving equations and inequalities
  - E. Absolute values
  - F. The Cartesian plane, equations of lines, distance formula
- II. Functions, Limits and the Derivative (5 weeks)
  - A. The definition of a function
  - B. Introduction to limits and continuity
  - C. The definition of the derivative
  - D. Rules of differentiation
  - E. The chain rule
  - F. Higher order derivatives
  - G. Implicit differentiation and related rates
- III. Applications of the derivative (3 weeks)
  - A. Increasing and decreasing functions
  - B. Concavity
  - C. Maximum and minimum values
  - D. Curve sketching
  - E. Optimization problems
- IV. Exponential and Logarithmic functions (4 weeks)

- A. Definitions of the exponential and logarithmic functions
- B. Laws of exponential and logarithms
- C. Exponential growth and decay
- D. L'Hôpital's Rule

V. Integration (2 weeks)

- A. Antiderivatives and indefinite integrals
- B. Integration by substitution

Sample