



OPEN

18.01 | Fall 2006 | Undergraduate

# Single Variable Calculus

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# Syllabus

## Course Meeting Times

Lectures: 3 sessions / week, 1 hour / session

Recitation: 2 sessions / week, 1 hour / session

## Prerequisites

There is no course at MIT which is a prerequisite for this course. The prerequisites are high school algebra and trigonometry. Students may also receive credit for 18.01 by transferring credit from a comparable college course taken elsewhere, or by passing an advanced standing exam.

## Course Goals

The basic objective of Calculus is to relate small-scale (differential) quantities to large-scale (integrated) quantities. This is accomplished by means of the Fundamental Theorem of Calculus. Students should demonstrate an understanding of the integral as a cumulative sum, of the derivative as a rate of change, and of the inverse relationship between integration and differentiation.

Students completing 18.01 can:

1. Use both the definition of derivative as a limit and the rules of differentiation to differentiate functions.
2. Sketch the graph of a function using asymptotes, critical points, and the derivative test for increasing/decreasing and concavity properties.
3. Set up max/min problems and use differentiation to solve them.
4. Set up related rates problems and use differentiation to solve them.
5. Evaluate integrals by using the Fundamental Theorem of Calculus.
6. Apply integration to compute areas and volumes by slicing, volumes of revolution, arclength, and surface areas of revolution.
7. Evaluate integrals using techniques of integration, such as substitution, inverse substitution, partial fractions and integration by parts.
8. Set up and solve first order differential equations using separation of variables.
9. Use L'Hôpital's rule.
10. Determine convergence/divergence of improper integrals, and evaluate convergent improper integrals.
11. Estimate and compare series and integrals to determine convergence.
12. Find the Taylor series expansion of a function near a point, with emphasis on the first two or three terms.

## Textbook

Simmons, George F. *Calculus with Analytic Geometry*. 2nd ed. New York, NY: McGraw-Hill, October 1, 1996. ISBN: 9780070576421.

## Course Reader

18.01/18.01A [Supplementary Notes, Exercises and Solutions](#); Jerison, D., and A. Mattuck. *Calculus 1*.

## Homework

There will be 8 problem sets, due on Fridays with one exception; returned in recitation. You may turn in one problem set late with no penalty, provided you do so before solutions are given out. Partial credit may be awarded for subsequent late homework, but you must talk with your recitation instructor.

## Exams

There will be four in-class 50 minute exams, and one 3 hour final exam.

## Make-up Exams

If you miss or fail an exam, you may take a make-up exam at certain arranged times. You will be notified by e-mail soon after taking an exam if you have failed it, so that you can plan for the make-up. Make-ups for failed exams can boost your grade only up to the lowest passing score (C-), which will be announced. Make-ups for full credit are permitted with a medical excuse. If you must be absent for other reasons, such as team sports, you must arrange to be excused in advance.

## Grading

| ACTIVITIES   | WEIGHTS |
|--------------|---------|
| Problem sets | 250     |
| Exams        | 400     |
| Final        | 250     |
| Total        | 900     |



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