Mathemtics UN1101
Calculus I
Section 002 and 003
Fall 2020
Columbia University

Instructor: Daniele Alessandrini.
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Office: 624 Mathematics.
Office hours: Tu. 5pm-6pm, Th. 3:30pm-4:30pm, online on Zoom. The Zoom link for office hours will be posted on Courseworks. Please send me an email in advance or just before connecting to Zoom to make sure I see you.

Classroom: online on Zoom.
Lectures: Section 002 Mo., We. 10:10am-11:25am; Section 003 Mo., We. 10:40am-12:55pm.

Required text: Calculus: Early Transcendentals, 8th edition, by James Stewart (CENAGE Learning). The book is available at the Columbia bookstore.

Prerequisite: No formal pre-requisites; an understanding of pre-calculus will be assumed.

Course outline: In this course we will describe some basic ideas and techniques that lie at the foundation of all pure and applied mathematics. We will discuss about functions and their limits, dervatives and integrals. We will focus on their meaning, significance, applications and methods of computation. We will use the firs six chapters of the course textbook (Calculus, Early Transcendentals, by Stewart). In more detail, we will cover:

1. Functions (Chapter 1).

   - Polynomials and rational functions.
   - Roots.
   - Exponential and logarithm.
   - Trigonometric functions.

2. Limits (Chapter 2).

   - Computation of limits.
   - Continuous functions.
   - Increasing and decreasing functions.

3. Derivatives.

   - Introduction to derivatives (Chapter 2).
   - Differentiation rules (Chapter 3).
   - Maxima and minima (Chapter 4).
   - Concavity (Chapter 4).

4. Integrals.

   - Computation of integrals (Chapter 5).
   - Applications of integrals (Chapter 6).

Homework: Homework exercises will be published online every Wednesday night, and the solutions are due one week later, on the next Wednesday by 11:30pm. The solutions must be handed in electronically, via Courseworks. We *will* accept late assignment, but we deduct 15% of the points for every day of lateness. We encourage collaboration on assignments, but all solutions must be written up by you alone in your own words.

Midterm exams: There will be midterm exams in class on Wednesday, October 7th and on Monday, November 23rd.

Final exam: Projected schedule for the final exam. For Section 002, Wednesday December 23rd, 9am–Noon. For Section 003, Monday December 21st, 9am–Noon. The date will be confirmed in November.

Exam details: To be announced soon.

Grading: I will first compute a numerical final score for every student. This will depend on the homework, the two midterms and the final exam. Every week the homework will be graded from 0 to 60 points. Every midterm and the final exam is graded from 0 to 60 points. The numerical final score is computed in the following way:

Let A be the average of the homework grades (where the two worst grades are discarded). Let M_1, M_2 be the grades of the two midterms. Let F be the grade of the final exam. The numerical final score S, also from 0 to 60 points, is given by

$$S = \frac{10A + 25M_1 + 25M_2 + 40F}{100} \, .$$

In other words, the formula is: Homework 10%, midterms 25%, final 40%.

After computing the numerical final score for every student, I will translate them into letter grades (A,B,C,D,F) using a curve. I will choose the curve after the final exam.