Math 1101: Calculus I

Welcome to Calculus I! In this course, we will study the foundations of single-variable calculus. In *differential calculus*, we start with a function and try to understand its rate of change. Differential calculus is a powerful tool for analyzing functions and for *solving practical problems* such as maximizing profit or minimizing the cost to produce an object. In *integral calculus*, we look at a closely related question: if we have a rate of change function (such as velocity), can we figure out "net change" (how far did we go?). We'll understand the *Fundamental Theorem of Calculus*, which describes a deep connection between integral and differential calculus.

Here is a tentative schedule, which may change as the semester goes.

Class	Date	Topic
1	09/04	1.1 (introduction, functions)
2-3	09/09, 09/11	1.2, 1.3, 1.4, 1.5 (more functions)
4-5	09/16, 09/18	2.1, 2.2, 2.3 (velocity problems, limits)
6-7	09/23, 09/25	2.5, 2.6, 2.7, 2.8 (continuity, derivatives)
8-9	09/30, 10/02	3.1, 3.2, 3.3 (basic differentiation rules)
10-11	10/07, 10/09	Review and Midterm I
12-13	10/14, 10/16	3.4, 3.5, 3.6 (advanced differentiation rules)
14-15	10/21, 10/23	3.9, 3.10, 4.1, 4.7 (linear approximation, max/min)
16-17	10/28, 10/30	4.3, 4.4, 4.5 (curve sketching, l'Hospital's rules)
18	~~11/04~~, 11/06	Review
19-20	11/11, 11/13	Midterm II, 4.9 (anti-derivative)
21-22	11/18, 11/20	5.1, 5.2, 5.3 (definite integrals, fundamental theorem)
23	11/25, ~~11/27~~	5.4 (indefinite integrals)
24-25	12/02, 12/04	5.5, 6.1, 6.2 (substitution rule, areas)
26	12/09	Final Review

General info

- Lectures: Math 312, M W 6:10pm - 7:25pm.
- Instructor: Chao Li, Math 614, chaoli@math.columbia.edu
- Office hours: M W 5-6pm, or by appointment.
- **Course Webpage** (Find weekly homework, TA contacts, anonymous feedback forms and so on): `http://www.math.columbia.edu/~chaoli/CalculusI.html`
- Calculus Director: Michael Woodbury (woodbury@math.columbia.edu)

Prerequisite

If you've ever learned a sport or a musical instrument, you know how important it is to be comfortable with basic skills; the same is true in mathematics – to be able to learn and use calculus, you must be fluent with precalculus. In particular, you should be very comfortable with graphing algebraic functions, exponential and logarithmic functions, and trigonometric and inverse functions by hand; simplifying expressions and solving equations involving such functions; using such functions to model scenarios. We will have a chance to quickly review them in the first two weeks.

Textbook

Calculus, Early Transcendentals (8th edition) by James Stewart. Purchase at:
`https://www.cengage.com/c/calculus-early-transcendentals-8e-stewart/`

If you need a physical book: this is available as a package consisting of a loose-leaf book and access to WebAssign from the publisher for $171.95, with ISBN number 9781305710306. The same package is available at the bookstore and from other sellers, possibly with a lower price.

If you don't need a physical book: access to WebAssign and the eBook version of the textbook is available from the publisher for $100, with ISBN number 9781337771498.

Any other package **with access to WebAssign** also works for this class.

Homework

The weekly homework consists of **two parts**: online WebAssign homework and written homework. Both written homework and online homework are **due before the class on Mondays**. **No late homework will be accepted** except medical or family emergency documented by a note from a doctor or a dean. The written homework is from the textbook (**8th** edition).

- Online homework (75 points) should be submitted online (`https://www.webassign.net/`). Use class key **columbia 6808 0975** to sign in. You may submit at most 5 times for each problem and only the last submission matters. Contact TA for technical issues.
- Written homework (25 points) should be submitted to the **course box on 4th floor of Math building** (**wall outside Room 407**). Each week one of TAs is assigned for grading. Contact the responsible TA for grading issues. Graded homework will be returned every Monday in class. Those not picked up in class will be stored in my office for 2 weeks for pick-up.

Homework/due date/grader: `http://www.math.columbia.edu/~chaoli/CalculusI.html`

Some homework problems will look different from problems discussed in class. This is intentional; the only way to develop a deep and flexible understanding of the material is to constantly practice applying it in different contexts. You are welcome to discuss homework problems with me during office hours.

Grading Policy

Your total score will be calculated using the following formula: **Midterm 1 (20%) + Midterm 2 (20%) + Final (40%) + WebAssign (15%, one lowest dropped) + Written Homework (5%, one lowest dropped).** Your letter grade is entirely determined by your total score. No extra credit projects will be offered.

When writing up your solutions to the written homework, show your computation and reasons. Solutions will be graded on correctness and explanation; in general, correct answers without work will not receive credit. You are welcome to collaborate with other students on solving homework problems. However, you must understand and write up your homework by yourself.

Exams

Two midterms will be held in class on Oct 9 (W) and Nov 11 (M). According to SSOL, the final exam is projected to be on Dec 16, 7:10-10:00pm. All exams are closed-book. The final is cumulative. Calculators/other electronics will not be allowed (and there is no need for them). Out of sequence exams will only be offered due to a medical or family emergency documented by a note from a doctor or a dean.