Instructors: Keith Merrill, Wei Lu, Yu Xin, Kewen Wang, Abhishek Gupta, and Te Cao.


Prerequisites. A grade of C- or above in Math 5a or a satisfactory score on the calculus placement exam at http://www.brandeis.edu/registrar/newstudent/testing.html#mathtest.

Important! We want you to succeed, and experience shows most students who struggle with Math 10a do so because they lack a solid knowledge of precalculus. For instance, on an exam you will have to work with expressions like these:

- $\ln(3\sin(t))$
- $a^{-2\log_a(2)}$
- $e^{2x} - 5e^x + 6$
- $\sec\left(\frac{\ln(x+2)}{x+2}\right)$
- $\ln\left(\frac{1}{\sqrt{x}}\right)$
- $\ln(x^2 - 1) - \ln(x - 1)$

If you’re at all unsure of whether Math 10a is the right course for you, please contact Professor Keith Merrill at merrill2@brandeis.edu.

Exams. There will be two midterm exams and a final exam. They are tentatively scheduled for the following dates and times. Once we have confirmation, we will let you know.

- Exam 1: Thursday, 2/14, 7:30-9:30 pm (location to be determined)
- Exam 2: Thursday, 3/21, 7:30-9:30 pm (location to be determined)
- Final Exam: During Math Common Exams block, TBD.

Midterm exams are in the evening since 10a is a multi-section course. If you have an academic conflict (such as a class, lab, or another exam) with a midterm, inform your instructor at least two weeks before the exam. If the conflict can’t be resolved, we will offer you a make-up exam.

Grades. Your grade in the course will be based on the following:

1. Homework
   - Homework assignments will be collected once or twice a week.
   - Out of fairness to everyone, and because of the difficulty in getting late homework graded, no late homework will be accepted. But your three lowest homework grades will be dropped, so that only your best scores count.
   - You are absolutely encouraged to discuss homework problems with your classmates, but you must write up your own solutions. You may not use any solution manuals.

2. Quizzes
   - Short quizzes will be given regularly.
   - The lowest 25% of your quiz grades will be dropped.

3. Two midterm exams
4. Final exam
Your grade for the course will be computed by taking the maximum of the following two numbers:

- Homework (10%), quizzes (10%), both midterms (25% each), final exam (30%)
- Homework (10%), quizzes (10%), highest midterm (25%), final exam (55%)

**Calculators.** You should have access to a scientific calculator (an online one is OK). Calculators are **not** allowed during exams or quizzes. You do not need a graphing calculator to complete your assignments.

**LATTE.** All course materials for Math 10a will be available online on LATTE. Log in at http://latte.brandeis.edu using your Unet username and password.

**Math 10a Self-quizzes.** As the semester progresses, if there is a topic you would like more help on, there is a link called “Self-quizzes” on your Math 10a LATTE coursepage. The Math 10a self-quizzes cover all the material discussed in the course. Complete solutions to each self-quiz are given. These self-quizzes are optional and for your use only, and have no effect on your grade. They are a very effective way to practice specific topics or skills if you’re struggling.

**Office hours.** You are encouraged to use your instructor’s office hours whenever you have questions about the course material. If you can’t attend office hours, don’t hesitate to ask for an appointment at another time. Making use of office hours is crucial to your continued success in your courses.

**Evening help sessions.** You are invited to attend the Math Department’s evening help sessions whenever you have questions or would like help with problems. These are drop-in sessions that are available to students in Math 5a, 10a and 10b every Monday, Tuesday, Wednesday and Thursday evening anytime between 7:00 pm and 9:00 pm. Help sessions are held in Goldsmith 101 and will begin Tuesday, Jan. 22.

**Four-Credit Course (with three hours of class time each week).** Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc).

**Students with disabilities.** If you are a student who needs academic accommodations because of a documented disability you should contact Professor Keith Merrill and present your letter of accommodation as soon as possible. Professor Merrill’s email is merrill2@brandeis.edu. If you have questions about documenting a disability or requesting academic accommodations you should contact Beth Rodgers-Kay in the Office of Academic Services at 63470 or at brodgers@brandeis.edu. Letters of accommodations should be presented at the start of the semester to ensure provision of accommodations. Accommodations cannot be granted retroactively.

**Academic Integrity.** You are expected to follow the University’s policy on academic integrity, which is distributed annually as Section 4 of the Rights and Responsibilities Handbook (see http://www.brandeis.edu/studentaffairs/sres/rr/index.html). Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in this course, please ask.

**Learning Goals for Math 10a.** Students in Math 10a will:

- Identify and apply key ideas and concepts, including:
1. The concept of limits, and how to compute a variety of limits.
2. The definition of the derivative, its interpretation in terms of slopes and instantaneous rates of change. *Its ubiquitous appearance in other contexts and courses.*
3. Compute the derivatives of a variety of functions.
4. Use derivatives to find extrema of functions, and solve optimization problems arising in numerous contexts.
5. Use information gained from algebraic information to draw qualitatively accurate graphs of functions. Synthesize a large number of pieces of information into a cohesive whole.

- Hone quantitative reasoning skills by solving problems that present familiar material in new ways.
- Practice breaking down a complicated problem into simpler pieces, solving those pieces, and reassembling them. This skill will help you in all your science courses.
- Gain confidence by employing a large number of techniques to solve commonly occurring types of problems.

**Topics covered in Math 10a (Differential Calculus)**

Order may change, certain topics may be skipped due to time constraints

Section 2.1 The Tangent and Velocity Problems
Section 2.2 The Limit of a Function
Section 2.3 Calculating Limits Using the Limit Laws
Section 2.4 Continuity
Section 2.5 Limits Involving Infinity
Section 2.6 Derivatives and Rates of Change
Section 2.7 The Derivative as a Function
Section 2.8 What does \( f' \) say about \( f \)?
Section 3.1 Derivatives of Polynomials and Exponential Functions
Section 3.2 The Product and Quotient Rules
Section 3.3 Derivatives of Trigonometric Functions
Section 3.4 The Chain Rule
Section 3.5 Implicit Differentiation
Section 3.7 Derivatives of Logarithmic Functions
Section 3.8 Rates of Change in the Natural and Social Sciences
Section 3.9 Linear Approximation and Differentials
Section 4.2 Maximum and Minimum Values
Section 4.3 Derivatives and Shapes of Curves
Section 4.4 Graphing with Calculus
Section 4.5 Indeterminate Forms and L’Hospital’s Rule
Section 4.6 Optimization Problems
Section 4.8 Antiderivatives
Section 5.2 Riemann Integrals
Section 5.3 Fundamental Theorem of Calculus