MATH 10a: METHODS AND TECHNIQUES OF CALCULUS
Spring 2017

Section 1
Instructor: Langte Ma
Office: Goldsmith 306
e-mail address: ltmafixer@brandeis.edu
Office hours: to be announced

Course Coordinator: Professor Keith Merrill, Goldsmith 303, merrill2@brandeis.edu.

Instructors: Keith Merrill, Langte Ma, Anurag Rao, Tarakaram Gollamudi, Rose Morris-Wright, Zachary Larsen.


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! Most students who struggle in 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 this:

\[
\ln(3 \sin(t)) \quad \sec\left(\frac{\ln(x + 2)}{x + 2}\right) \quad a^{-2 \log_a(2)}
\]

\[
\ln\left(\frac{1}{\sqrt{e}}\right) \quad e^{2x} - 5e^x + 6 \quad \ln(x^2 - 1) - \ln(x + 1)
\]

If you are unsure whether Math 10a is the right course for you, please contact Professor Keith Merrill (merrill2@brandeis.edu).

Exams. There will be two midterm exams and a final exam.

- Exam 1: Tuesday, Feb 14, 7:30-9:30 pm in Schwartz 112 (Schwartz Auditorium).
- Exam 2: Tuesday, Mar 21, 7:30-9:30 pm in Schwartz 112.
- Final Exam: Tuesday, May 9th, 9:15am–12:15pm (to be confirmed by the registrar)

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 one week 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 (10% of your grade)
   - Homework assignments will be collected once or twice a week.
   - No late homework will be accepted, but your three lowest homework grades will be dropped.
   - We encourage you to discuss homework problems with your classmates, but you must write up your own solutions. You may not use any solution manuals.

2. Quizzes (10% of your grade)
   - Short quizzes will be given regularly.
   - No make-up quizzes will be given. Missed quizzes count as zeroes. However, the lowest 25% of your quiz grades will be dropped.

3. Two midterm exams (each 25% of your grade)
(4) Final exam (30% of your grade)

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.

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 10b Self-quizzes. There is a link called “Self-quizzes” on your Math 10a LATTE coursepage. The Math 10a self-quizzes cover all the material being studied in Math 10a. 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.

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.

Four-Credit Course (with three hours of class-time per 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.).

Evening help sessions. You are welcome 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 room 101 and will begin on Tuesday, January 20 (tentative).

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/srsc/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:

- Understand and apply key ideas of calculus, including:
  1. Understand the concept of limits and be able to compute a variety of limits
  2. Understand the definition of the derivative, and its interpretation in terms of slopes and instantaneous rate of change
  3. Compute derivatives of various common functions
  4. Use derivatives to sketch qualitative graphs of (even quite complicated) functions
5. Use derivatives to find the extrema of a function, and solve optimization problems.
6. Compute antiderivatives of common functions.

- Hone quantitative reasoning skills by solving problems that present the material in new ways.
- Learn how the specific skills learned in math 10a transfer to other disciplines by solving applied problems from other fields, such as biology, chemistry, physics, and economics.

**Topics covered in Math 10a**

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