

**MATH 10B: Techniques of Calculus (b)**  
**Summer 2021**

Section 1

Instructor: Kewen Wang

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Lecture hours: M,T,W,Th 11:10 AM–1:10 PM

Office hours: Monday: 13:10-14:00 (EDT), Thursday: 22:00-23:00 (EDT)

**Textbook.**

- Herman, E., & Strang, G. (2016). *Calculus* (Vol. 2). OpenStax, Rice University.
- Stewart, J. (2010). *Calculus: concepts and contexts* (4th ed.). Brooks/Cole Cengage Learning.

**Prerequisites.** A satisfactory grade of C- or higher in MATH 10a or placement by examination. Continuation of 10a. Students may not take MATH 10a and MATH 10b simultaneously. Students may not take MATH 10b if they have received a satisfactory grade in MATH 20a.

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

- Midterm 1: Jul. 15, Thu. 20:00-22:00 (EDT)  
Covers definition of integration; fundamental theorem of calculus; integration technique.  
Midterm 2: Jul. 29, Thu. 20:00-22:00 (EDT)  
Covers Areas; volumes; differential equation. (and topics in before midterm 1).
- Final: Aug. 6, Fri. 20:00-22:00 (EDT)  
Covers sequences; series; and convergence test. (and topics before midterm 2).

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

**(1) Homework**

- There will be two types of homework assignments, short and long assignments. Short homework assignments will be collected daily, and long homework assignment will be collected weekly.
- Long assignment will be weighted three times as the short assignment.
- Out of fairness to everyone, and because of the difficulty in getting late homework graded, **no late homework will be accepted.** But your **two** lowest short homework grades and **one** lowest long homework grade 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 every class except Monday, and long quizzes will be given weekly on Monday.
- The lowest **two** short quiz grades and **one** lowest long quiz grade will be dropped, so that only your best scores count. Unexcused missed quizzes will count as zeros.

**(3) Midterm exams**

**(4) Final exam**

Your grade for the course will be computed by taking the maximum of the following two numbers:

- Homework (15%), quizzes (15%), midterms (40%), final exam (30%).

**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 15a will be available online on LATTE. Log in at <http://latte.brandeis.edu> using your Unet username and password.

**Office hours.** I will hold office hour remotely via Zoom. 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 two hours of class time each day).** Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 4 hours of study time everyday 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 present your letter of accommodation to your instructor as soon as possible. If you have questions about documenting a disability or requesting academic accommodations you should contact Student Accessibility Support at <http://www.brandeis.edu/accessibility/>. 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/srcs/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 10b.** Students in Math 10b will:

- Identify and apply key ideas and concepts, including:
  1. Understand the definition of the definite integral, and its interpretation in terms of area and net change.
  2. Understand the relationship between differential and integral calculus (The Fundamental Theorem(s) of Calculus).
  3. Learn to compute elementary integrals and to use the following techniques of integration: substitution, integration by parts and partial fractions.
  4. Understand improper integrals and learn to determine if an improper integral converges.

5. Understand some of the applications of integration, including area, volume, arc length and average value of a function.
  6. Learn what a differential equation is, and how to solve simple differential equations (including separable equations).
  7. Understand the definition of an infinite series and how to test a series for convergence.
  8. Understand the definition of a power series and learn to find the interval of convergence of a power series.
  9. Learn to find the Taylor series of a function.
- 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 10b (Integral Calculus)**

Order may change

Section 3.6	Inverse Trig Functions and their Derivatives
Appendix F	Sigma Notation
Section 5.1	Areas and Distances
Section 5.2	The Definite Integral
Section 5.4	The Fundamental Theorem of Calculus (FTC I)
Section 5.3	The Fundamental Theorem of Calculus (FTC II)
Section 5.5	Integration by Substitution
Section 5.6	Integration by Parts
Section 5.7	Additional Techniques of Integration (Partial Fractions)
Section 5.9	Approximate Integration (Midpoint and Trapezoidal Rules)
Section 5.10	Improper Integrals
Section 6.1	More about Areas
Section 6.2	Volumes (Disks and Washers)
Section 6.4	Arc Length
Section 6.5	Average Value of a Function
Section 7.1	Introduction to Differential Equations
Section 7.2	Solving Separable Differential Equations
Section 8.1	Sequences
Section 8.2	Introduction to Series
Section 8.3	The Integral Test
Section 8.4	Other Convergence Tests (Alternating Series Test and Ratio Test)
Section 8.5	Power Series
Section 8.6	Representations of Functions as Power Series
Section 8.7	Taylor and MacLaurin Series