

Math 20A Multivariable Calculus
MW 8:00-9:30am Via Zoom

Instructor:	Ying Zhang
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Lecture Zoom Link:	https://brandeis.zoom.us/j/96538300315
Ying's Office Hours:	M 9:30-10:30am, W 2:00-3:00pm, or by appointment.
PhD Grader:	Xiaoying He (email: xiaoyinghe@brandeis.edu)
Xiaoying's Office Hours:	T 2:00-3:00pm.
Textbook:	<i>Multivariable Calculus</i> , James Stewart, 8ed , ISBN: 978-1305266643. (e-copies available through Brandeis library)

Course Description:

Students in Math 20a will extend on the concepts in single-variable Calculus to learn the fundamentals of multivariable calculus and matrices including vector-valued functions, partial derivatives and multiple integrals, extremum problems, line and surface integrals, Green's and Stokes's theorems.

Prerequisites: Single variable calculus (Math 10A&B or equivalent) and linear algebra (Math 15A or equivalent). With regard to linear algebra, we will make constant use of vectors as a language for geometry. Students are expected to know dot and cross products, and projections of vectors onto lines and planes, as covered in sections 12.1–12.4 of the book. As the course goes on students will need to understand the linear functions and matrices, and determinants.

Main Learning Goals:

- Extend the definition of the derivative and integral to vector functions.
- Define and compute partial derivatives.
- Write level curves and find tangent planes.
- Understand and compute directional derivatives.
- Define and determine differential and gradient of a multivariable function.
- Compute double and triple integrals.
- Learn about vector fields and how to compute line integrals.
- Define conservative vector fields and understand path independence.
- Apply Green's theorem, Stoke's and the divergence theorem to solve integration problems.

Course Outline (Subject to change):

- Equations of lines and planes, cylinders and quadric surfaces (12.5 and 12.6, approx. 1 week)
- Vector functions (Chapter 13, approx. 2 weeks)
- Partial Derivatives (Chapter 14, approx. 3.5 weeks)
- Double and triple integrals (Chapter 15, approx. 3.5 weeks)
- Vector calculus (Chapter 16, approx. 3.5 weeks)

Grading Policy:

- Worksheets - 15%,
- Homeworks - 25%,
- Quizzes - 10%,
- Midterm - 25%,
- Final - 25%.

1). Worksheets: Worksheets will be issued weekly available by Thursday on **Gradescope**, and must be submitted by the end of the following Wednesday. Each worksheet contains an overview and a list of key concepts of the lectures in the following week, as well as a few questions that help you to identify the essential components of the lecture, the main theorem(s), and important methods. The worksheet is designed to help you recognize key ideas covered in lectures.

Worksheets will be graded based on completion. Full credit (10/10) if you have made a **strong** effort and finished almost the entire worksheet, half-credit (5/10) if you have skipped several parts or made a poor effort on finishing the worksheet, no credit (0/10) if you have done almost nothing or made a poor effort on finishing most of the worksheet.

2). Homeworks: Weekly homework assignments will be given on Wednesday on **Gradescope**, and must be submitted by the end of class the following Wednesday. **You are encouraged to work with your classmates. However, you should write your solutions by yourself and with your own words, and make sure to list their names.**

There will be about 5 problems *randomly selected* for grading for each homework assignment. Each problem is worth 10 points. Please finish your homework in a neat and complete way so that partial credits can be given. Your lowest homework score will be dropped.

3). Quizzes: Each Wednesday we will have a short, 10-minute quiz, which you will take individually using **Gradescope**. The quiz will be based on the homework due the previous week or lecture. The lowest quiz grade will be dropped. Calculators, textbooks, and lecture notes are not allowed.

4). Exam Policy: The midterm and the final will be given as take-home exams. You will have 24 hours to finish it. You may use textbook, lecture notes or Internet to assist you. **You may work with your classmates but please write your solutions by yourself and make sure to list their names as well as all the resources you use.**

If the exam date and time conflict with other university duties, document medical (or other) emergency, the instructor must be notified at least **one** week before the exam, and a makeup exam will be given separately.

Late and Graded Homework Policy: Late homework will not be accepted unless there is a emergency/unexpected situation and an extension will be given. Homeworks will be graded on **Gradescope**. It is your responsibility to make sure you receive back any homeworks you submitted, and to store them in case any grades are incorrectly recorded. If you do not receive back a homework you submitted, please talk with me *immediately*. I will not discuss missing or incorrectly graded assignments at the end of the semester.

Lecture Participation/Video Recording: You are highly encouraged to attend each lecture synchronously. If you are having difficulties with Internet, you may watch the recorded lectures that will be available on LATTE. I will also post lecture notes on **LATTE** no more than 24 hours after each lecture.

Remote Office Hours: Weekly office hours will be hold remotely via Zoom. You may ask any question related to the course material (homework, lecture notes, etc) or just come and mingle!

Expectation of Students' Effort: Success in this course is based on the expectation that students will spend **a minimum of 9 hours of study time per week** in preparation for the class (reviewing class material, completing homeworks, preparation for exams, etc.).

Accessibility Support: If you have a disability for which you are or may be requesting an accommodation, 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: Cheating/plagiarism will not be tolerated. 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.

COVID-19 Updates: Brandeis University will be closely monitoring COVID-19 situation. Any adaptation that shall be made can be found at <https://www.brandeis.edu/coronavirus/>.